THE IRON TRADE REVIEW

VOLUME XXVII. CLEVELAND, O. JUNE 14, 1894. CHICAGO, ILL. NUMBER 24

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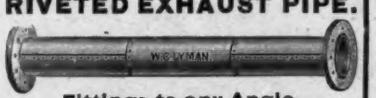

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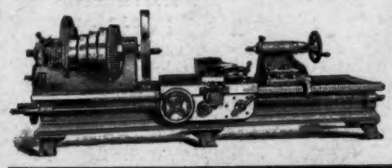

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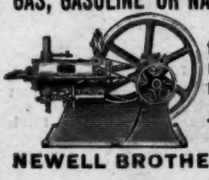

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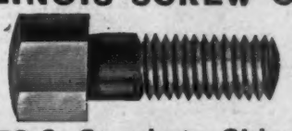

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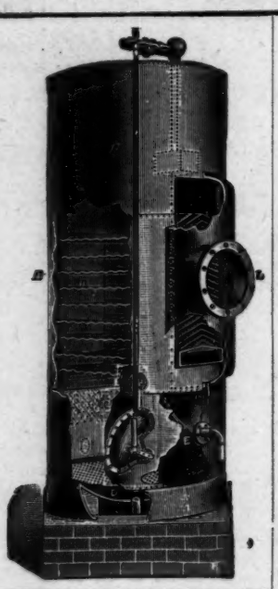

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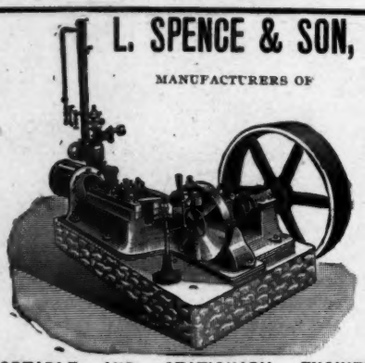

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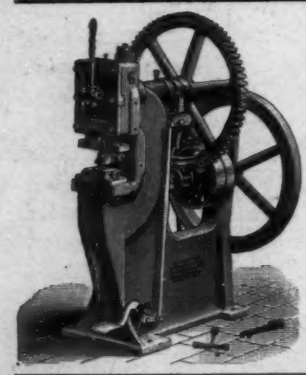

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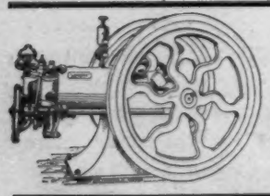

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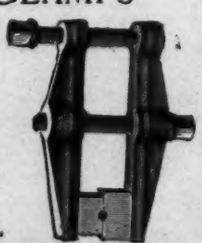

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THE IRON TRADE REVIEW

VOLUME XXVII. CLEVELAND, O. JUNE 14, 1894. CHICAGO, ILL. NUMBER 24.

THE WEEK IN IRON CIRCLES.

GENERAL FEATURES.

The announcement of an agreement between the coal miners' officers and a majority of operators in important districts means that the fuel embargo will soon be raised. The iron industry will get its share of the benefits of renewed activity, but the Columbus settlement does not reach the Connellsville coke strike, and until that is settled there cannot be a general resumption of iron making west of the Alleghenies. The past week has brought further gains by the coke operators, but colonization is a slow process. When the expected breaks occur in the strikers' ranks, then production will be resumed on a scale that will allow the blast furnaces to start. At present only a half dozen furnaces in the Pittsburg district are in operation and one that was active in the Shenango valley has been compelled to bank. The question of most immediate interest is as to the price of Bessemer iron after Pittsburg and Valley furnaces generally resume. Figures on the few deals closed in the week vary from $11 to $11.50, on deliveries that begin in July, in the transaction covered by the latter figure, and run close to the end of the year. A bear brokerage influence is at work, offering iron in lots of moderate size, deliveries to the end of the year, at a price below what any furnace is willing to make. Spot Bessemer is still practically unobtainable, and the price ranges above $13. Reports from Chicago indicate a better movement of foundry iron and on silveries a firmness in price. Southern irons were more active than in the preceding week. In view of the advance in freights, quotations are now made at furnace. In the East, while a degree of firmness is reported in Northern irons, Southern No. 2 foundry has sold as low as $10 delivered in Philadelphia. The steel billet market shows no special development. Eastern buyers are not willing to pay the price asked—about $20.50 for 30-day delivery. At Pittsburg a few transactions are reported at $17.25 and $17.50 on future shipment, while $19.50 was paid for a few hundred tons, immediate shipment. The shut-down at Duquesne and the fact that billet-makers will be consumers of their product for a time after resumption tend to make a firm market. At Chicago, sales for delivery after July 1 were made last week at $18.25, transactions totaling 8,000 tons. Mill products in all markets are bringing better prices, the coal famine having gradually cut down the number of producers. Eastern mills have all the orders they can take care of this month, at 1.35c. to 1.40c. for plates and angles. Among Western mills able to make deliveries, there is reported a fair run of business, particularly in sheets.

THE CLEVELAND OUTLOOK.

Sales of iron ore made in the past week were somewhat less in volume than in the preceding one, and consisted chiefly in piecing out lots of 10,000 to 15,000 tons. With the exception of two or three ores of limited output, which were especially sought and for which later buyers were willing to pay 10 or 15 cents a ton more than the first prices, there has been no advance, but all the conditions surrounding the market support the firm feeling noted for some time past. At the opening of the season there were but 100,000 tons of unsold standard Bessemers on the docks, and the indications point to a closer adjustment of production to demand than has been the case for several years past. The question of lake freights is an important factor in the account; certainly little or no unsold ore would come down, if present ore prices were maintained, accompanied by an advance in lake freights. Within the past week the rates on ore that ruled through the greater part of May have continued—80 cents from the head of Lake Superior, 65 cents from Marquette and 50 cents from Escanaba. It is believed that nothing but a very heavy grain movement, of which there are now no indications, will cause any advance from this basis. An element in the ore situation that is not altogether unexpected is the announcement in an Ironwood, Mich., dispatch, that miners there have made a demand for advances ranging from 25 to 50 cents a day.

Pig Iron. As the end of the coal strike appears in view, and prospects improve, for a considerable increase in the output of Connellsville coke, there is a general canvassing of the situation as to Bessemer pig for delivery after resumption. Several transactions at Pittsburg are reported elsewhere, in one of which the basis was $11.35 at Valley furnace, deliveries extending through the year. Buyers, who are just now principally brokers, report lower offers than this. In one instance a furnace has made a price of $11 in the Valley on a 5,000-ton lot, deliveries in August and September. It is reported that this has been shaded in the price named by another furnace on a lot of equal size. We hear of a Cleveland transaction, deliveries for the balance of the year, at $11 delivered. A proposed deal in which Bessemer iron is to be taken for coke—10 tons of coke at the oven for a ton of Bessemer at Valley furnace—is also reported. Furnacemen differ not a little in their views of the future. The few whose coke contracts on the old basis run into the fall, know what to depend upon, as do the fewer number who have arranged for coke for the balance of the year at $1.25, but the large majority are holding off from the market because they have no contracts for coke, and because they want all contingencies settled as to the cost of furnace labor. In foundry iron the chief feature has been the brisk shipments, in view of the advance in freights on Friday. Small lots have been sold at $11 and $10 Valley furnace for No. 1 and No. 2, and some sellers have got 25 cents higher. In charcoal iron there is a very light movement, the malleable concerns having bought last year considerably in excess of their requirements. Current transactions are at 14@14.25, Buffalo.

Finished Material. Inquiry for mill products has slackened somewhat; how much of this is due to the coal strike can be judged later. Bar iron is sold at 1.05c. mill and 1.10c. from store, with only a moderate business going. Tank plates are generally maintained by Pittsburg mills at 1 25c. as a minimum, though there is evidence of anxiety for orders that has shaded this price in one or two transactions. Angles are 1.30c. at mill and beams and channels, 1.35c. to 1.50c. In Cleveland a projected block requiring 1,500 tons of material and a county and a city bridge will soon test the market.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Crude metal again takes the lead in sales this week, with quite a large tonnage closed. Prices continue to be strong, and the advance in freight rates which will take place on the 15th, has in several instances already resulted in higher quotations. General market conditions are quiet, and it seems likely will remain so for several weeks to come.

PIG IRON.—Large sales of local coke iron—amounting in all to about 17,000 tons—were made last week, included in which were several orders ranging from 1,000 to 2,000 tons. Prices obtained were a little better than buyers have heretofore thought possible, and in fact it seems to be true that consumers have about arrived at the conclusion that iron is as low at the present time as it will be in the near future. In Southern iron also a good business was done, with at least one order of 1,000 tons closed. Prices on Southern irons are considerable firmer because of the advance in freight rates of 15 cents a ton, going into effect June 15. Ohio irons have also been advanced, the freight having been increased 40 cents a ton. Silvery irons, both Ohio and Southern, are very scarce—in fact, Southern silveries are practically not to be had. Soft irons are also very scarce, and no furnaces will sell large lots for immediate delivery.

BARS.—Business in iron bars continues to show improvement, and quotations are held quite firmly at 1.10c to 1.15c. Ohio mills quote an even higher price, owing to the advance in freights. Steel bars are in good demand but no sales have been made. Quotations are made at 1.30c to 1.40c.

STRUCTURAL MATERIAL.—Only a small business is going, no large orders being in the market. Prices are made as follows: Beams and channels, 1.50c; angles, 1.45c to 1.50c; plates, 1.45c to 1.50c; tees, 1.65c to 1.70c. Small lots from stock are .10c to .15c higher.

RAILS AND TRACK SUPPLIES.—The usual run of small orders is to be recorded, but none of any size. Prices are unchanged. Rails, $25 to $27; splice bars, 1.40c; track bolts, 2.20c to 2.30c; spikes, 1.70c to 1.85c.

BILLETS AND RODS.—Quotations on billets have been reduced to $18.25 to $18.50, and at these prices about 8,000 tons were sold last week. In rods there is no change, and quotations are made at $25 to $25.50

PLATES.—Quite a good trade has been received in orders for delivery from stock, but mill business has been light. Quotations are unchanged. Tank steel, 1.45c to 1.50c; flange steel, 1.65c to 1.75c; fire box steel, 3.75c to 4c; boiler tubes, 75 per cent. discount.

MERCHANT STEEL.—Business has been limited to stove trade, which has been quite fair. Quotations are as last reported. Open hearth spring, machinery and tire, 1.85c to 1.90c; crucible spring, 3.50c; machinery, 4.50c to 4.75c; tool steel, 6½c and upwards.

SHEETS.—A good inquiry is received for black sheets, which are held firmly at 2.40c to 2.50c for No. 27 common. Galvanized iron has been in fair demand, with prices maintained at 75 and 10 per cent. discount.

OLD RAILS AND WHEELS.—No sales are reported, and the demand is very light. Prices are still quoted nominally as follows: Old steel rails, $7 to $10, according to length; old iron rails, $10, and old car wheels $10 to $10.75.

SCRAP.—Business is very light, and prices are only nominal. No. 1 forge, $9; No. 1 mill, $6 to $6.50; No. 1 machinery, $7; axles, $13; cast borings, $3.50; wrought turnings, $4; axle turnings, $5.50; mixed steel, $5; coil steel, $7; leaf steel, $8; heavy cast, $7; stove plate, $5.

GENERAL MARKET RESUME.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. There is still an active demand for spot Bessemer and steel billets, with scarcely any material procurable. Two spot transactions in the latter, 500 tons each, are reported at $19 and $19.50 respectively. For future delivery a sale of 3,000 tons is reported at $17.25 and another of 1,000 tons at $17.50, but there is comparatively little doing in this direction. There is said to be some speculative Bessemer at a valley furnace but it has not yet come upon the market. We hear of a sale of a few hundred tons at $13.75. Further sales for future delivery are reported—one of 10,000 tons, deliveries extending through the year, at $11.35 valley furnace and another of 5,000 tons, deliveries to Oct. 1, at $11.50 valley furnace. Contracts for coke have been placed, running through the last half of the year, at $1.25 and this is expected to be the basis quite generally. In the past week there have been further shut downs of mills and those having finished material in stock have been selling at an advance. Iron bars are selling at 1.10c; steel bars at 1.20c.; beams and channels, 1.30c. to 1.40c.; universal plates, 1.25c. to 1.35c.; tank steel, 1.25c.; flange, 1.45c. to 1.55c. Only two billet mills are now in operation.

Cincinnati. The current week has been marked by quite a number of small orders for pig iron for immediate shipment, from the Central and Western districts. The larger portion was for car loads and 50-ton lots. The threatened advance of freight rates by the Central Traffic Association on the 15th inst. excites only a languid interest on the part of the buyer. The Southern furnace companies have taken the position that they will sell at current prices for delivery the next 60 or 90 days, but the figures must be based on price at furnace, and the buyers must stand whatever advance there is in freight rates. Eastern buyers are apparently looking with somewhat more favor on iron at low prices now existing, and in some cases have made their purchases covering probable requirements for remainder of the year. The foundry stocks held by Northern furnaces are gradually being depleted, and after a number of the plants which have been producing foundry grades change their output to Bessemer, which is their intention after the strike is over, it is believed that there will be less competition and somewhat higher prices. Makers of Bessemer iron are widely at variance in their views as to prices that will be obtained when operations are resumed. Quotations during the past week show a difference of about $2.00 per ton between the highest and lowest sellers. The market for charcoal brands is unchanged. The movement of this grade of iron is in small lots, to consumers who are making special work. The car companies are practically doing nothing, and can not be induced to purchase.

Buffalo. The improved demand for iron noted during the past two weeks continues, and is now well defined. Prices are firm and are so recognized by buyers who have tested the market. A large number of furnaces formerly on foundry grades will resume on Bessemer as soon as fuel can be obtained. The Lake Superior charcoal market shows considerable activity with numerous inquiries. In the face of the present depression, which is said by the general trade to be the worst since the panic began, the conditions surrounding pig iron surely give cause for encouragement.

THE IRON TRADE REVIEW

DEVOTED TO
IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES, IRON ORE PRODUCTION, TRANSPORTATION, AND GENERAL INDUSTRIAL PROGRESS.

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ENTERED AT THE POST OFFICE IN CLEVELAND, O., AS SECOND CLASS MATTER.

JUNE 14, 1894.

THE DEMAND FOR BESSEMER ORES.

When the blast furnaces of Western Pennsylvania, Ohio, West Virginia, and Illinois are again in operation, it is safe to say that their burdens will represent a larger tonnage of Lake Superior Bessemer ores than they have ever before carried at one time. For nearly six months past, leaving out the period covered by the coal strike, the output of furnaces using Lake Superior Bessemers has formed a larger percentage of the country's consumption —whether in the form of crude or finished material—than in any other equal period. The campaign of "any-price-to-get-the-order" which prevailed last winter filled up Pittsburg mills with Eastern contracts and this was succeeded by a period of low freights particularly favorable to Pittsburg producers. With the demand for their product cut off in its natural market, Eastern producers of Bessemer kept dropping out of the race; meantime, with cheap Connellsville coke and cheaper Bessemer ores than they had ever been able to buy, furnaces in the Pittsburg district and the valleys made prices so low that the resumption of these Eastern furnaces was still further postponed. Then came the buying of Pittsburg and Valley Bessemer, to the extent of over 150,000 tons within a short period, to feed converters farther East. To what extent this will continue after resumption comes, is a question that will depend somewhat on the prices that rule for the Western product.

The significant fact to which we call attention in this connection is that the demand for Lake Superior Bessemer ores in 1894 is likely to be the largest yet reached. In 1892, when the Bessemer pig iron production of the country reached its height, at 4,444,041 gross tons, the consumption of Lake Superior Bessemer ores was 5,500,000 tons, or about three-fourths of the total. Last year, there was a falling off to 3,568,598 gross tons of Bessemer iron, for the country, and counting the same proportion as in the preceding year, the consumption of Lake Superior Bessemer ores was 4,500,000. In the Shenango valley and in Allegheny county a remarkable exception to the prevailing decrease from 1892 is noted, the Shenango valley producing 234,496 tons of Bessemer in the panic year, against 176,205 tons in 1892, and Allegheny county producing 1,370,955 tons last year as against 1,324,101 the year previous. In both these districts there was a decrease in the total of forge and foundry iron from 1892, presumably an indication that the increased production of Bessemer was to that extent a displacement of iron by steel. That these districts should add to their output of Bessemer in such a year as 1893 is indication of a drift toward steel that promises to be more strongly emphasized this year. The known substitution of steel pipe for iron pipe to a greater extent than before, and the consumption of steel sheets for tin plate manufacture in the Shenango valley, leaving out of the account the demands of the new steel plant at Youngstown, which may not be in operation until late in the year, add to the probability of a large increase upon the 1893 output of Bessemer in the districts named.

Putting together the extension of the market in the East, for Bessemer iron and finished steel produced from Lake Superior ores, and the new uses for steel in the territory always supplied by these ores, and the claim of good authorities, that the demand for Bessemer ore from the lake region this year will reach 6,000,000 tons, seems not unreasonable. Already sales have been made that go beyond 5,000,000 tons, and it is known that there are furnaces whose ordinary engagements to the opening of navigation next year are far from being satisfied.

A PHASE OF THE MACHINERY PROBLEM.

There is some short-sighted theorizing as to the effect of machinery upon the condition of wage workers, as there has been short-sighted figuring on the tariff question. A radical change in the cost of production in any line, due to the introduction of machines displacing hand labor, has an immediate effect detrimental to workmen who had done by hand what the machine does many times more rapidly. But it is the general experience that decreased cost always rapidly increases consumption and the expansion of the producing industry means many machines, many men engaged in operating them, many men engaged in manufacturing them. In other words the world really increases its wants in that single direction and the number of workers required to satisfy the world's wants grows correspondingly. The adjustment is one that requires a larger vision than that of the man who has lost a job because a machine has come in. A type-setting machine displaces five printers, let us say. There may be no jobs at hand-type-setting awaiting these men. The type-setting machine is their enemy, at first glance. But reduced type-setting cost means a cheaper newspaper; or, since the one-cent paper cannot reduce its price, a better newspaper for a cent, so that many more people buy newspapers than before. Hence more printing presses, more activity in paper mills, more men employed in these industries, more men employed in distributing the newspaper—a score of expansions, in a word, that add to the demand for labor.

It is to be remembered, in all this, that there cannot exist the ability to absorb the added production due to machinery, unless there is a large body of employed wage-earners whose condition is such that they are able to indulge new wants. It has been the experience in this country, at least, that wage-earners in a given employment have been able not only to keep pace with the enlarged scale of living, that has come within a generation, but have a larger surplus than was possible in the day of simpler wants and fewer machines. The rapid growth of savings bank accounts in manufacturing districts indicates this.

If there did not exist this capacity to take on added production, the fact would soon show itself in excessive

machine-made output, and the substitution of the machine for hand labor would be checked. The cheapening of products that has been a familiar fact in industrial development in the United States has been attributed in some quarters to the introduction of machinery. But it is forgotten, in this connection, that such a result is contingent upon the reserve purchasing capacity to which we have alluded, and that means a generally employed body of well-paid wage-earners.

The question has a relation, and an intimate one, to the tariff policy which the country has so well maintained in the past 30 years.

IN the circular letter of the United Mine Workers' officers to the various local organizations, declaring the strike settled in the States represented at the Columbus conference, the fact was recognized that the lawlessness of the strikers was alienating public sympathy and every day lessening the chances of a settlement favorable to the men. Among a law-abiding people, the resort to violence in defiance of law, will always weaken the cause so attempting to win, but organized labor is very slow to learn. Homestead should have been lesson enough on that point for a generation, but it has been followed by a long line of similar crimes, all committed in labor's name. When Ohio's Governor sent $10 to the Massillon, O., miners' relief committee, the other day, the contribution was promptly returned with the message that the miners "abhor the contamination of your charity." Gov. McKinley's offense was that, in execution of his sworn duty, he had used the militia of Ohio to maintain law and order against strikers who were destroying property, threatening lives and defying the authorities. There is a very damaging admission in this message of the Massillon strikers' committee; and yet not more so than is contained in the declarations of more than one convention of organized labor. Hostility to the law enforcing arm of the State, as represented in the militia, has come to be almost a plank in the platform of some divisions of unionism. Many labor leaders, we know, repudiate such sentiments, but there are others who have advised members of the unions to keep out of the militia—confessing thereby that their organizations will not hesitate to resort to acts requiring the assembling of the militia against them. The appeal to brute force and the sanction of murder and destruction of property, as means of enforcing wage demands, are disgraces which representative unionism cannot too plainly condemn. The line ought to be so clearly drawn, that the public may know where legitimate trade unionism parts company with anarchism and defiance of law.

IT is creditable to the progressive spirit that has presided over the development of the iron industry of the South, that the untoward conditions that have prevailed for the past year have not been allowed to block the most important step yet proposed. There has been much preliminary talk about a large steel plant in Alabama, and now the planning of months is about to have practical outcome. A steel plant is to be erected at Bessemer with a daily capacity of 300 tons of billets. The *Manufacturers' Record* says:

That a company has now been organized by Mr. H. F. De Bardeleben, one of the pioneer iron manufacturers of Alabama—a man whose success in reducing the cost of iron-making to the lowest possible limit is so well known as to need no commendation—and Col. A. M. Shook, so long identified with the Tennessee Coal, Iron & Railroad Co., to build a plant that will cost about $1,000,000, means a new starting point in the industrial advancement of the South. The building of this plant and its success will necessarily be followed by the construction of other steel plants, and gradually by a widening out of all the diversified manufacturing interests which have iron and steel as their foundation. The *Manufacturers' Record* has the assurance of Mr. De Bardeleben that ample means have been secured, and that the plant will be built as soon as the plans can be got ready.

MANUFACTURERS in the exceptional position of having to increase their facilities have found the prices of iron work for such additions, in the past few months, so low as to overcome objections growing out of the fear that general conditions would not warrant the expenditure. Structural cast iron and structural steel have been at prices amounting to a veritable temptation. But it has taken some nerve, even where financial arrangements could be made, to go ahead with such enterprises, in the face of the policy buyers of raw iron have been compelled to follow. Fully convinced that prices, already below the English basis, could not go lower, they have been unable, with few exceptions, to buy for work not already contracted for or in hand.

THE following transcript of a contract recently made illustrates how the incredible, from the standpoint of a few months back, is becoming regular market history. At Cincinnati, 1,000 car wheels, 33-inch, double plate, of 550-lbs. weight, made from all old wheels, were sold at $4.50 apiece. The old wheels cost $8.50 per ton, and the transaction is said to have represented a good profit to the car-wheel maker. Wheels at a cent a pound have been noted within the past three months as straining the possibilities of solvent business to the last tension, but the sale we quote cuts close to .8c. and still leaves a margin. Survivors of the day of $27 wheels can only look on in speechless horror at such signs of degeneracy.

Bright Tin Without Paint.

At one of the sessions of the American Society of Mechanical Engineers at Montreal, June 5-8, a paper was read by M. P. Wood, pointing out the advantages and disadvantages of the various methods of protecting iron and steel from rust. He refereed to tinning, enameling, lacquering, etc. It had been noticed that many roofs in Montreal were covered with tin plates that had not been protected by paint or otherwise, and were bright. J. F. Holloway called attention to this and asked an explanation, which was given in the fact that tin plates, not terne, were used, and that there was no salt air in Montreal.

AT the recent meeting of the directors of the Niles Tool Works, Alexander Gordon was elected president, R. C. McKinney general manager and treasurer and James K. Cullen secretary. Mr. Cullen, who has had charge of the Chicago office for a number of years, has removed to Hamilton, Ohio, which will be his address for the future. G. F. Mills has been appointed manager of the Chicago branch, to succeed Mr. Cullen.

THE Drexel Railway Supply Co. have secured the Treat car wheel plant at East Chicago, Ind., and will utilize it for the manufacture of their specialties. W. H. Robertson, 60 S. Canal st., Chicago, recently sold to the Drexel Co., for use in their new works, a 24x40 Columbus Machine Co. blowing engine and a 54x16 tubular boiler.

THE Detroit Foundry Equipment Co., Detroit and Chicago, have recently secured the contract for equipping the new car wheel foundry at Lenoir, Tenn., which is being built by J. H. Bass, with the Whiting car wheel system.

THE Isaac D. Smead Foundry Co. and the Smead Heating & Ventilating Co., Toledo, O., went into the hands of a receiver June 12. Colonel Smead was appointed. The liabilities are $250,000; assets not reported.

THE DRIFT OF COMMENT.

Time to Get up and Move On.—Of what has happened we probably know enough, and of what is anticipated it would not sour the public mind to read more. We are not in the dumps without reason, but that we should stay there when we might get out is, if a weakness, yet a folly.—[Age of Steel.

* * *

The Coal Miners' Trust Proposal.—The widespread stoppage of coal mining has caused much loss and suffering in many branches of transportation and manufacture not connected with the origin of the dispute and not able to assist in putting an end to it. It has taken the avowed form of an attempt on the part of the organized miners to coerce the operators of bituminous coal mines, first to form a "trust," obliterating their individual character, and destroying free competition among themselves (an act explicitly forbidden by the "Anti-Trust Law"), and secondly, in the character of such a trust, to establish uniform rates of wages for each geographical region. At the Cleveland conference, the miners refused to make any agreement, unless all the operators were represented—including many whose mines were still running, and whose workmen were contented, and had refused to strike. The operators, on the other hand, have refused (much to their credit, in my opinion) to form an illegal trust for the purpose of treating with a corresponding "labor" trust, and of sacrificing free capital, free labor and the public interest to the profit of such a large joint monopoly.—[Dr. R. W. Raymond in Engineering and Mining Journal.

* * *

The Day of Larger Buying at Hand.—There is one noticeable feature of business to-day that has a marked influence on the outlook. This is the preparations that are being made for future trade. . . . The country has economized during the past year, and has more money to spend than is absolutely required. The question is when to begin. Just now, we are buying only what we need for to-day, without regard for to-morrow. The time will come when the distributors and users will buy, must buy, for future needs or else get lost in the shuffle. The manufacturers have wisely, if conservatively, anticipated this time and are prepared to meet its demands. It may not come in full force much before the close of the year, but unless the signs of the times are wrong, or they are mistaken by a careful observer, they point to a gradual increase in business and a full recovery and increase at an earlier date than seemed possible when the present year began.—[Stoves and Hardware Reporter.

* * *

A Calamitous Combination.—Summarizing the influences that combined to bring about the reign of low prices in the iron and steel industry, the *Iron Age* names eight: 1. The aftermath of the Baring failures. 2. The culmination of real estate booms and town building speculations. 3. The completion of the enormous iron and steel producing plants. 4. An apparent superabundance of crops all over the world. 5. The opening up of a new iron ore field. 6. The destruction of capital invested in railroads. 7. The decline in the value of silver. 8. The tariff legislation. It concludes: "This is a formidable array of the chief influences which have borne down prices of iron and steel, as well as other manufactured goods. Some of them are of sufficient importance to have depressed the national market with their own unassisted weight. Taken together they form a combination so powerful in depressing prices that it can well be seen why values here have in some cases dropped below the European level. Now that the point of conjunction of all these forces is past, that some of them have spent their force and the market has slightly recovered, it seems entirely reasonable to believe that a complete relapse to the very low prices of the first quarter of the year will not take place."

* * *

Railroad Demand Ahead.—A journal which is an authority on railroad matters gives a showing of the amount of new work projected throughout the country. Its list includes 411 lines aggregating a proposed length of over 22,500 miles, and representing every one of the 48 States and Territories, the speedy construction of which appears to be demanded. Business depression such as the country has been laboring under for almost a year temporarily stops railroad building, and the depression is made much worse by the fact that railway development nearly ceases. The authorities agree, however, on one point, which is that the first indications of returning prosperity will start quite a lot of new railroad work. When this comes we may know that the gloom has been lifted from the business of the country.—[American Manufacturer.

Death of Joseph K. Bole.

The sudden death from apoplexy, of Joseph K. Bole, president of the recently formed American Steel Castings Co., was announced at his home in Cleveland, Friday morning June, 8. Mr. Bole has spent most of his time in Chester, Pa., since the formation of the company above named, his family remaining in Cleveland. A slight indispostion on the day preceding his death was known to his associates, but there were no alarming symptons until Thursday night. Born in Allegheny City, Pa., in 1848, he began life as a telegraph messenger boy. In young manhood he was employed in a steel works in Pittsburg and in 1874 he removed to Cleveland. With Hon. Charles A. Otis and the late Thomas Jopling he became interested in the enterprise which grew into the present Otis Steel Co., with which he was associated, even after its sale to an English syndicate until the first of the present year, when he resigned his position as one of the managing directors. Very soon afterwards he was elected president and general manager of the American Steel Castings Co., having a large interest in the Solid Steel Co., of Alliance, one of the members of the combination. He became a director of the Valley Railway in 1891 and the following year was made receiver of the road together with Henry M. Kleim. Mr. Bole is survived by his wife and seven children.

Minnesota Iron Co. Meeting.

The annual meeting of the Minnesota Iron Co. was held at Duluth, Monday, June 11, on the return of the board of directors, several stockholders and others, including directors of the Duluth & Iron Range Road, from their annual tour of inspection of the railroad and the mines of the Minnesota Co. The party included Robert T. Lincoln, ex-secretary of war; Benjamin Brewster, D. Ogden Mills, H. R. Bishop, G. F. King, William Harriman, H. H. Hollister, Henry Seibert, A. R. Flower, brother of Governor Flower, George H. Ball and A. T. Van Nest, of New York; Samuel Mather, of Cleveland; Marshall Field, of Chicago; H. H. Porter, chairman of the board of directors of the Iron Range road; J. C. Morse, president of the Illinois Steel Co.; J. W. Doane, Lazarus Silverman, Murray Nelson, Dr. E. C. Dudley, J. H. Chandler, C. W. Hilliard, vice president and general manager of the Iron Range; C. P. Coffin, secretary of the Minnesota Iron Co., of Chicago; John S. George, of Milwaukee, and J. L. Greatsinger, president of the road, and D. H. Bacon, president of the Minnesota Iron Co. All the old officers of the company were re-elected at Monday's meeting.

Against High Chimneys.

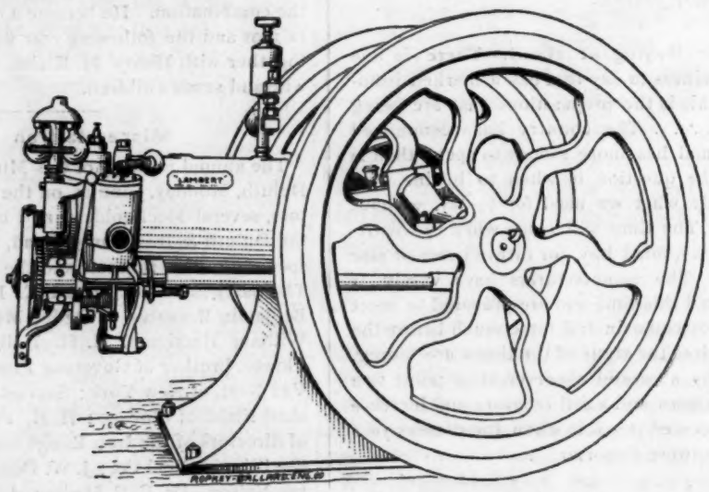
Wm. R. Roney's paper on "Mechanical Draught," before the American Society of Mechanical Engineers at Montreal last week, was an argument in favor of fuel economizers and mechanical draught, rather than high chimneys, and described some apparatus. In discussion it was shown that most of those taking part believed in the economy and general advantage of mechanical draught. President E. B. Coxe, of Drifton, Pa., said that "the most expensive way of getting a draught is by a chimney, even if the chimney is given to you." He used a combination of forced and induced draught, and believed that the draught should be under better control than is possible when depending upon a chimney alone. The draught should be controllable, perhaps automatically so.

S. T. WELLMAN, president of the Wellman Iron & Steel Co., of Thurlow, Pa., and Geo. W. Goetz, consulting engineer of the Philadelphia Co., of Pittsburg, sail for Europe on June 27. The Philadelphia Co. is planning to manufacture producer gas on a large scale, and part of the mission of these gentlemen is an investigation of the latest European achievements in this direction. Mr. Wellman expects to visit some of the prominent steel works in England and Germany.

LAMBERT GAS AND GASOLINE ENGINE.

The rapid development of gas engine manufacture in the past two years is proof of the wide-spread and fast-increasing application of this form of motive power. There has been of late, also, an expansion of the capacity of these engines for performing work, and manufacturers have gradually added to the heavy-power uses to which they can be applied. In the Lambert engine, of which we present an illustration, it is claimed that particularly economical means are provided for deriving power direct from the heat energy of the products of petroleum, preferably 74° gasoline. The liquid is used in its natural state in the Lambert engine and is stored in a galvanized iron tank, which may be placed within or without the building and direct connection made with the engine by means of a small iron pipe. The gasoline is at all times closely confined until it passes into the cylinder, when it is exploded by means of an electric spark, and after having spent its power passes off through the escape pipe perfectly harmless. The governor regulates the supply of gas or gasoline, permitting it to enter the cylinder only as called for by the load on the engine.

The Lambert is compact and is built plainly and serviceably. All valves are direct-acting poppets, requiring no cleaning or oiling. They lift squarely from their seats and are not liable to wear out. The crank shafts are made of steel and finished to gauge. All bearings are exceptionally large and strong. The cylinder bed and main bearings are constructed of one strong, symmetrical casting, to which the entire valve gear is attached, insuring durability.



LAMBERT GAS AND GASOLINE ENGINE.

The makers of the Lambert engine, the Buckeye Mfg. Co., of Union City, Ind., guarantee that on the basis of 784° gasoline being worth 7 cents a gallon, their engine will cost less than ¾ cent an hour per indicated horse power. The cost of running the Lambert gas engine is much less than gasoline where natural gas can be procured at 25 cents per 1,000 feet. The water used in the two h. p. gasoline and gas engine is from two to three gallons a day. The claim is also made that the engine is made from the best material procurable and by the best workmen, the makers agreeing to replace free any parts that may turn out defective either in material or workmanship. All engines over two h. p. are fitted with two fly wheels. They are made from one to 50 h. p. The four h. p. engine, of which a cut is given herewith, makes 300 revolutions a minute. The driving pulley is 12 inches diameter, with 6-inch face; the floor space is four feet two inches by two feet four inches; the weight, 900 lbs.

THE National Tube Works strikers at McKeesport, Pa., have ended their campaign of riot, but this is accounted for by the abandonment of the company's attempts to operate the words. General Manager Converse says that his company will enter suit against Allegheny courty to recover the value of property destroyed through lawlessness. He says that the loss will be tens of thousands, including a large sum for the cooling of the gas furnaces and the destruction of their linings. At Duquesne, the tube workers are still out, also.

IRON SMELTING BY ELECTRICITY.

Commenting on the Taussig process of smelting by electricity, on which Consul General Frank H. Mason, at Frankfort, Germany, recently made a report, the *Engineering and Mining Journal* says: "The German experiments in smelting iron ore by electricity show an apparent technical success, but leave much to be desired from an economic point of view. The inventor, who would naturally make out the best case possible for his process, puts the cost of making pig iron at $9.65 per ton, with ore at $2.40 per ton. This he thinks may be reduced by $1 or $1.50 per ton with a large plant, where not less than 1,000 H. P. is available. Now a cost of $9.50 or even $8.50 for pig iron in the present state of the market is not going to leave a margin of profit which will induce any ironmaster to abandon his blast furnaces and put in a new and cstly plant. Nothing is said of the quality of the iron produced, in the report, this important point being entirely ignored. Electric smelting has great possibilities for the future; but the cost of the process must be cut down materially before we can count it as a practical success."

Consul Mason's report of what has been accomplished thus far makes these points:

1. It has been shown that by this process a degree of heat sufficient to smelt a ton or more within 15 minutes may be generated, sustained, and applied at will without the use of carbon electrodes and without excessive heating or injury to other portions of the circuit.

2. Castings of iron and steel, up to a weight of 200 lbs. or more, have been made, which have shown all the desirable qualities—smoothness of surface, fineness of texture, and freedom from the impurities which are always more or less incident to smelting by ordinary methods.

5. Pig iron of excellent quality has been produced in small quantities by direct smelting from Swedish ores. The tests of this iron, as made by the Royal School of mines at Berlin, give net results, which may be summarized in the statement that the tensile strength of a round rod 10 mm. (0.39 in.) in diameter was 3,410 lbs. and the resistance to compression of a rod 301 mm. (11.85 in.) in length and 30 mm. (1.18 in.) in diameter, was 57,850 kilos., or 127,270 lbs.; that is about 22,000 lbs. and 116,080 lbs. per square inch, respectively.

The apparatus includes a long, air-tight smelting channel or chamber, the hearth of which inclines to a central orifice, through which the fused metal passes into the molds. This chamber is filled with the metal to be smelted, and heat is generated by passing an adequate current of electricity through the mass without the use of any kind of fuel, or the employment of carbon electrodes. The furnace is lined with glazed firebricks, which insulate quite perfectly the contents of the chamber, so that the heat is developed evenly throughout the mass, and very little, if any, loss of current is experienced.

THE Ellwood City, Pa., tin plate mill will start next week and, with the new machinery, an output of 30,000 pounds a day will be made. Orders on hand will keep it running several months.

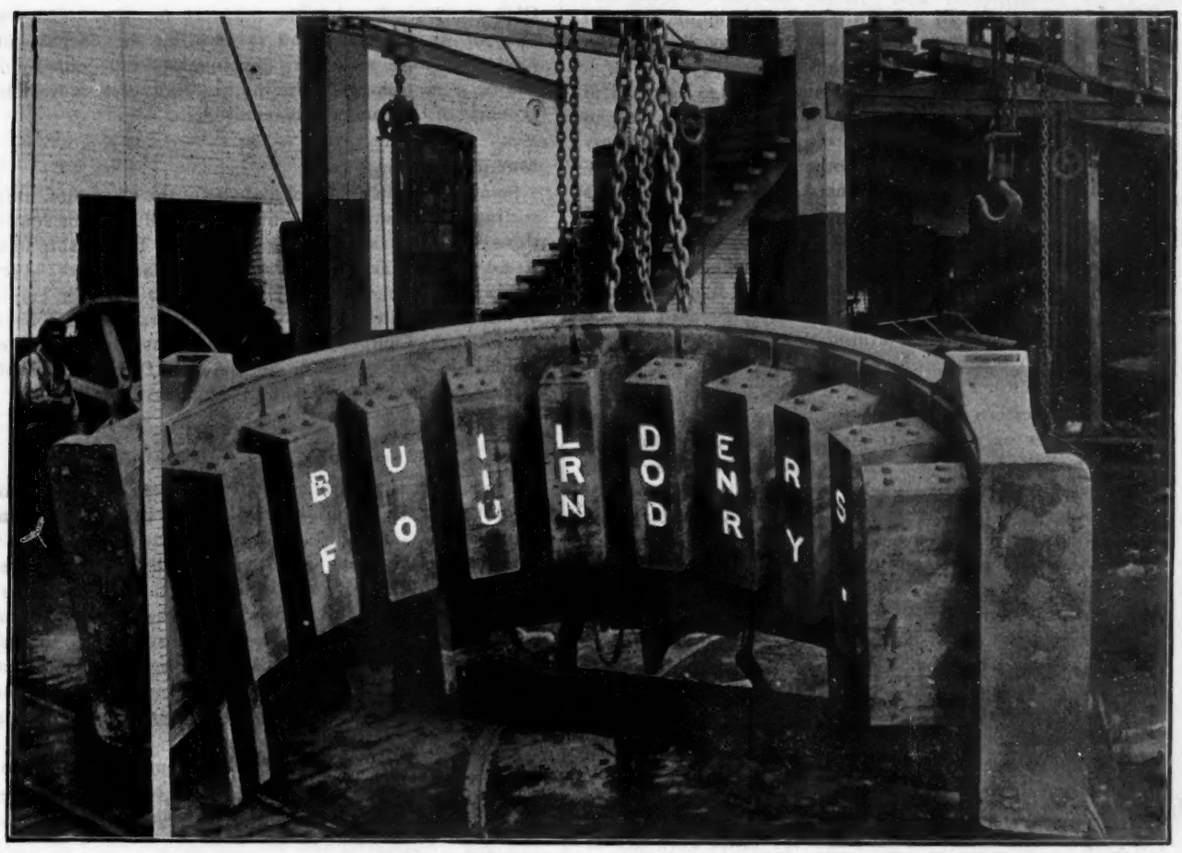
A DIFFICULT CASTING.

A piece of heavy foundry work involving some difficulties is shown on this page. The casting illustrated is one-half of one of the General Electric Co's 550,000 watts alternating dynamos. The special difficulty encountered was in the fact that the ten laminated wrought iron pole pieces had to be cast in and it was essential that they be absolutely united with the cast iron and very accurately spaced. The capacity of the cranes in the Builders' Iron Foundry, Providence, R. I., in which the casting was made is 25 tons each.

THE COAL AND COKE STRIKES.

The outcome of the conference of coal operators and miners at Columbus, Saturday and Monday, June 9 and 11 was the signing of an agreement resolution putting mining rates 10 cents below the demand of the men. The new scale goes into effect June 18 and ends May 1, 1895. It is as follows: Pittsburg, thin vein, 69 cents; thick vein, 56 cents; Hocking, 60 cents; Indiana bituminous, 60 cents; Indiana block, 70 cents; Streator, Ill., summer, 62½ cents; Streator, winter, 70 cents; Wilmington, summer, 77½ cents; Wilmington, winter, 85 cents; LaSalle, Ill., and Spring Valley, summer, 72½ cents; LaSalle and Spring Valley, winter, 80 cents. Other sections in Northern Illinois field at prices relative to the above. It is not believed that the above schedule is satisfactory to all miners. Many in the Pittsburg district, it is said, will object to 69 cents, and on the other hand there are operators who say they will pay the 55 cents for which their miners agree to work and not a cent more. The miners claim to have gained a point in the recognition of their union by operators who have not done this heretofore, but it will require the outcome of negotiations between operators and men, mine by mine, to determine the extent of this recognition. It is evident that there will continue to be cuts under the scale, and that the attempt to eliminate the evil of price-cutting, with consequent wage-cutting has not been successful. In Ohio, several regiments of militia are scattered over railroads conveying coal from West Virginia to Lake Erie and to some extent the blockade has been raised, but bridge burning and dynamiting are reported as recently as Tuesday. Later advices from Columbus say that many protests are being sent in to the miners' headquarters against the compromise, some of the dispatches declaring that the men would repudiate the agreement.

In the Connellsville coke regions there are reported further conflicts between deputies and strikers and several of the latter have been killed in the past week. A delegate convention of coke workers, held at Scottdale, June 8, voted to continue the strike, but not a word was said in condemnation of rioting or attacks on men at work. The operators have brought in furthern contingents of outside men, chiefly negroes from Southern points. They are gaining, but the gain is comparatively slow. Shipments, however, have reached upwards of 300 cars a day and additional Pittsburg furnaces are preparing to get in blast. The operators claim to have considerably above 4,000 ovens now in blast. For the week ending June 2, the Connellsville *Courier* estimates the production at 36,865 tons, with 3,527 ovens active. The shipments were 1,520 cars, of which 800 were to Pittsburg, 620 to points further west and 100 to Eastern points. Prices for prompt delivery are still high. Furnace coke has brought about $3 a ton and foundry coke all the way from $3.50 to $6 a ton. There is a general impression that the price of furnace coke on contracts for the rest of the year will be in the neighborhood of $1.25 when there is a general resumption of production, and some transactions are reported at Pittsburg on that basis.



A NEW CASTLE, Pa., dispatch says that the first consignment of Southern pig iron ever brought to that city arrived June 9, being consigned to the Baldwin & Graham Stove Works. The fact that only a fraction of the furnace output of New Castle is foundry iron and that that has been cut off by the strike accounts for the importation of Southern iron just now.

THE Union Malleable Iron Works of Moline, Ill., were sold June 9 to C. H. Deere, the plow manufacturer. The concern will be re-incorporated July 1, and it is to be run in the interests of Deere & Co., and the Deere & Mansur Co., both of which have heretofore largely purchased their malleables from outside concerns.

THE stock in the yards of the American Pig Iron Storage Warrant Co., June 10, was 99,900 tons, 1,500 tons having been put in within the preceding 10 days and none taken out.

AMONG THE IRON MINES.

Menominee Range:—

The statement published in a number of Lake Superior papers that the entire output of the Chapin mine for the season has been sold, needs some qualification. The sales thus far made cover all the ore that is likely to be mined up to the date, early in August, on which the mine will be sold under foreclosure proceedings, by the holders of the bonds issued last year, after the Schlesinger failure. This foreclosure and sale will be followed by a reorganization, which will include interests now closely identified with the property. It would, of course, be impossible to make sales of ore beyond the probable output up to the date of the sale, as the control of the property after that time will be in the buyers whoever they may be. There are at present nearly 550 men at work in the Chapin and they are paid twice a month for work done to date. Though the wages are low, they are worth 10 to 15 per cent. better than they would be under the old plan, by which the men were paid on the 20th or 25th of a month for the work done in the month preceding. Having cash in their hands the miners are able to buy to much better advantage, and numbers of them, who were on the verge ot starvation before the mine started, have repeatedly acknowledged their appreciation of the existing arrangement, which was made possible by the efforts of M. A. Hanna & Co., of Cleveland.

The force at the Badger now consists of 140 men, all of whom are working full time. A reduction of 25 per cent. in wages was made the first of the current month, the company now paying fully as much as any other mine in the district. The daily output has been increased to 600 tons, and this amount is being transported by rail each day to Escanaba for shipment to lower lake ports. The Commonwealth Iron Co., has over 100,000 tons of ore in stock at the Badger, but none of this is being shipped at present. It is quite likely that the Badger's force of men will be materially increased as the season advances.—[Florence Mining News.

Gogebic Range:—

The Northwestern road has been taking all the ore from Gogebic mines on its line, to Ashland this year. In other years, before the Lake Shore became a part of the C. & N. W., a considerable amount of Gogebic ore went by way of Escanaba. Shipments from Ashland are therefore very heavy this year. Comparative figures show that up to June 16, 1892, (the year of Ashland's great record) 487,717 tons had been taken from that port. To June 10, 1893, the total was 231,210 tons; to June 11, this year, 470,042 tons. For the week ending June 11, the Wisconsin Central docks shipped 46,794 tons; for the season, 143,385. The Northwestern shipments for the week were 58,526 tons and for the season 328,657 tons.

Orders were received Saturday, June 2, by Capt. J. J. Anderson of the Eureka mine to begin shipping from the stock-piles and also to unwater the mine as promptly as possible preparatory to resuming the hoisting of ore. The loading of cars was accordingly begun the first of the week, as also the work of pumping out the mine. To facilitate the latter work one of the large balers formerly employed at the Ashland mine has been secured. . . . A sale of 20,000 tons of Brotherton ore having been made, the work of shipping that amount from the stock-pile is in progress. Only about 10 cars a day are furnished, however, as shipping is blocked for the want of coal for the vessels.—[Bessemer Pick and Axe.

Vermilion Range:—

The publication of ore shipments from Two Harbors docks, which has been kept up regularly and with detail, for the past two years, in spite of the fact that figures were not given out at other ports, excepting Ashland, has now been discontinued.

On a recent day, 101 cars were loaded at the Minnesota properties with one steam shovel.

In the name of Mack, Nye & Co., suit has been begun in the United States court, at Duluth, against H. M. Bradley, A. W. Bradley, E. L. Bradley, H. H. Hanford, J. L. Washburn and others. The defendants are alleged to be owners of a majority of stock of the Zenith Iron Co. The plaintiffs claim to have entered into a contract to handle the ore of the company. They were to advance $40,000 on an estimated output of 75,000 tons. They did advance $32.500 and 12,883¼ tons of ore were shipped. The amount claimed to be due is $28,222.44.

Mesabi Range:—

The Canton hoisted 1,526 tons of ore in 20 hours, this being the best record yet made. In the month of May the mine's output was 31,307 tons.

A number of improvements have been made at the Franklin, putting it in shape for increased shipments. A new engine house has been erected and a new Reynolds engine, together with a four drum hoisting plant has been put in. A new boiler house is also being erected and three boilers will constitute the plant. A new shaft house is being erected at No. 1 shaft, and hoisting from this shaft will begin soon. At present about 1,500 tons per day are being hoisted from No. 2 shaft.

At the annual meeting of the Ohio Mining Co., at Duluth, the following officers were elected: George W. Green, president; George F. Lamb, vice-president; F. S. Vreeland, secretary; Thomas E. Sloan, treasurer; and James H. Temple, general manager. All reside in New York. These, with W. C. Gilbert, of Grand Rapids, Charles Purdy, of New York, T. H. Pressnell and Dr. Fred Barrett are the directors. The Ohio company has let the contract for the further stripping of its properties, and is awaiting the decision of the motion to have a receiver appointed to take charge of its affairs, a motion made in the pending case in which the property of the company is involved.

Marquette Range:—

Some fifty men are employed about the Champion mine in sorting and crushing ore, which force will likely be continued throughout the season. The company have a shipment of 10,000 tons to make, when shipping will cease unless other orders are received. . . . There are now 250 men employed at the Queen mine. . . . Mining operations have been resumed at the Cambria, a small force of men being employed, which will be increased or decreased as the condition of the market may seem to warrant.—[Negaunee Iron Herald.

More Iron Going into Buildings.

The low prices for iron and steel are very certain to work a revolution in the building trades, as they have already done in many others. Buildings that are as nearly fire-proof as it is possible to make them, with iron walls, floors, roofs and stairways, and with brick, stone or terra cotta in other parts can now be erected at a cost but very little beyond that involved in putting up the same sized wooden structure. The loss in first cost is more than compensated for by the saving in insurance and the advantages of a more substantial and permanent building, while the expense of maintenance and repairs is decidedly in favor of iron.

It is sometimes said that a dwelling house built of iron is less house-like than where wood is used as the material—that it has the appearance of hasty and ill-advised construction and, as our English cousins and brothers-in-law would say, is "cheap and nawsty." This may have been true some years ago but is not true or even partly true in these days of structural development. The Columbian Fair presented instances of dwelling houses where wood did not enter, that were just as artistic and even æsthetic as any of their wooden rivals, while there are hundreds of examples of the new art in building scattered all over the country. But even if the art or the style were lacking, iron would come into use in time as a matter of necessity. Our forests are being rapidly depleted and even now the question of future supplies is being agitated Iron is practically inexhaustible, at least for dozens of generations, and its cheapness and superiority in many ways are the strongest arguments in its favor, let alone the security to life and property which its use as a building material affords. —[Stoves and Hardware Reporter.

W. A. DAVIS, manager of the Chicago office of the Billings & Spencer Co., 17 S. Canal st., reports having had a very much better business in the past month, than for some time previous. He expects that the month of June will show very good sales.

MACHINE SHOP AND FOUNDRY.

A KEY FOR REGULATING FOUNDRY MIXTURES.

BY W. J. KEEP, DETROIT.

The composition of cast iron is so imperfectly understood, that few realize that there is a direct relation between the shrinkage of a half inch test bar, and that of a casting. I will illustrate the truth of this by table XIV (continuing the numbers of my last paper), the figures of which are mostly taken from actual tests. To produce a uniform grain and a sound casting, and one-eighth of an inch shrinkage to the foot, the silicon must vary with each variation in the size of the casting.

TABLE XIV.

AN APPROXIMATE KEY FOR REGULATING FOUNDRY MIXTURES.

Size of the Casting.	Silicon required in the Casting.	Shrinkage for the best castings.	Shrinkage of a ½ inch Test Bar.	Size of Test Bar "Keep's Test."
½" square...	3.25 per cent.	.125 per foot.	.125 per foot.	½" square.
1" square...	2.75 per cent.	.125 per foot.	.135 per foot.	½" square.
2" square...	2.25 per cent.	.125 per foot.	.145 per foot.	½" square.
3" square...	1.75 per cent.	.125 per foot.	.155 per foot.	½" square.
4" square...	1.25 per cent.	.125 per foot.	.165 per foot.	½" square.

But such a variation in silicon will cause a relative variation in the shrinkage of a ½ inch square test bar. The table shows that a casting 1 inch square needs 2.75 per cent. of silicon, to give it a shrinkage of .125, and that a ½ inch square test bar from the same metal will show a shrinkage of .135; but that a casting 4 inches square, on account of its slow cooling, needs only 1.25 per cent. of silicon to produce the same grain and shrinkage.

The .165 shrinkage of the ½ inch square test bar, shows that the iron will make a casting 4 inches square with a shrinkage of .125, and that it contains the correct amount of silicon.

The following experience, series XV, during the present coal strike, is an illustration of the value of this relative test.

SERIES XV.

No. Test.	Change of entire iron mixture and coke in 4 days. Good iron each day. 839 was a little hard.	Dead Load.		Shrinkage.		Chill.
		Stren'th.	Deflec'n.	½ inch Square	Flat.	
837	Old iron mixture with Connellsville coke.....	417	.24	.129	.144	.04
838	New iron mixture with Connellsville coke.....	407	.22	.148	.153	.07
839	New iron mixture with Pocahontas coke.....	377	.19	.158	.160	.09
840	New iron mixture (silicon increased) with Pocahontas coke.....	419	.23	.141	.150	.05
841	New iron mixture (silicon same) with Pocahontas coke	423	.23	.131	.146	.09
842	New iron mixture (silicon same) with Pocahontas coke	436	.23	.128	.141	.04

The mixture 837 was perfectly satisfactory, but owing to a stoppage in shipments of pig iron a new mixture 838 was made. The shrinkage shows the need of more silicon, and the correction could have been made at once, but as it was necessary next day to change to a coke which was claimed to be purer, the iron mixture was not changed for 839. Next day the silicon of the mixture was increased in 840, and a continuance of another day 841 brought the iron back to the standard. 842 shows that silicon must be slightly decreased next day.

WESTERN FOUNDRYMEN'S ASSOCIATION.

The third meeting of the Executive Committee of the Western Foundrymen's Association was held in the office of the Secretary at 4 P. M., on Thursday, June 7th, 1894. Mr. Geo. M. Sargent, President, in the chair. The members present were Geo. M. Sargent, H. L. Hollis, J. M. Sweeney, W. N. Moore and the Secretary.

The question of discontinuing the publication of the official proceedings in pamphlet form was fully discussed, and it was finally decided to do nothing in the matter. In order to provide funds for carrying on the business of the association, a resolution was adopted instructing the Secretary to give notice at the next meeting of the association, to be held on June 20th, of an amendment to the by-laws making the admission fee $5 and the annual dues $10.

Another amendment to the by-laws, of which the Secretary will give notice at the coming meeting, provides that "the regular meetings of the association shall be held bi monthly, at such time and place as the Executive Committee may elect. Twelve members shall constitute a quorum."

The next regular meeting of the Western Foundrymen's Association will take place on Wednesday evening, June 20th, at 7:30, in room 702 Western Union Building, Jackson St., cor. Clark St., Chicago. A paper by Mr. Thos. D. West entitled "Round vs. Square Test Bars," read by title at the May meeting and printed in the official proceedings of that meeting will be read and discussed. The secretary urges that all members be present, and extends to non-members a cordial invitation to be present and take part in the discussion.

FOUNDRYMEN'S ASSOCIATION.

The monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club, Philadelphia, on the evening of Wednesday, June 6. In the absence of President Schumann, Vice-President Devlin presided. The Executive Committee reported that after a general investigation it found the foundry trade in a very depressed condition; in fact, no better than it has been during the last seven or eight months. The average is about as follows, showing the condition of about 100 foundries: Running full time, or six heats a week, 10; five heats a week, 25; four heats a week, 25; three heats a week, 35; and five entirely closed down. The prices for castings were reported very much reduced, and although pig iron has fallen in price, castings have fallen twice as much. Some concerns have stopped altogether, owing to the scarcity of bituminous coal, due to the strikes. "There appears to be little likelihood of a change in the near future," the report concludes, "and it seems to us this year's business will be unprofitable."

The treasurer reported $194.58 in the treasury and all bills paid.

When the reports of sectional committees were called for, Mr. P. D. Wanner, representing the cast-iron-pipe section, said: "The consumption of cast iron pipe is very great, despite the depression. The demand, however, is easily supplied, Pipemen are selling below cost, and manage to get along simply by selling large quantities. The South coming in with cheap iron, cheap fuel and cheap labor has ruined the trade and prices. I can see no future for the pipe trade for years to come. This trouble might have been controlled some years ago, if the manufacturers had been confined to their several districts. The only thing for us of the North to do is to pool our interests, build foundries in the South, and meet these people on their own ground. Pipe has sold lately for $14.75—that is, second-hand pipe—and first-class pipe has been sold as low as $17."

Robert Register, of Baltimore, representing the soil pipe section, reported quite a number of foundries now running full time and prices firm.

Mr. E. E. Brown, of the sash weight section, said: "The volume of business is considerably less, and prices are on the toboggan, and not yet near the bottom."

Strength and Resilience of Structural Cast Iron.

Mr. Stanley Flagg, Jr., read a paper by Prof. J. B. Johnson, of St. Louis, on the "Strength and Resilience of Structural Cast Iron," from which extracts are given below:

The working qualities of structural castings are of extreme importance. Furthermore, these qualities can be tested, and are tested of necessity in the finishing of castings for service. Any failure of the working qualities is immediately discovered by the machinist and corrected by the foundryman. The strength and the toughness of the castings, however, are two qualities which are not usually determined at all, except by such incidental indications as come from the breakage of these parts in practice under loads or shocks, which they were assumed to be able to resist. This indication is of course a very inadequate one, and gives at best no measurable test of the strength or toughness of the iron. Strength and toughness are not identical, and the one does not give any indication of what the other may be. Thus a very strong iron may be a very brittle one, and on the other hand a very tough iron may be comparatively weak.

Cast iron is not usually used in structures to carry tensile

stress alone, but generally used for columns and beams. In machinery castings, however, where all the parts are made of cast iron, some parts are subjected wholly to tensile stress. There are three kinds of strength, therefore, of cast iron, which may be determined by actual tests, namely: tensile strength, compressive strength and strength in cross bending, as a beam. When a cast iron beam, or any cast iron form, is broken in cross-bending the fracture always occurs on the tension side of the member, and hence the failure is one in tension. In the case of cast iron columns, provided the load is symmetrical and the column is equally strong on all sides, the failure would be one in compression. It so happens, however, that the tensile strength of cast iron is a good measure of both its cross-bending and of its crushing strength; that is to say, that cast iron which is strongest in tension is likely to be strongest in compression and in cross-bending.

All kinds of strength of cast iron, therefore, may be determined by a tension test. The tension test has one advantage over the cross-bending test, inasmuch as the whole length of the tension test specimen is subjected to the same stress, and if there be a flaw anywhere in the entire length of the specimen, failure will occur at that point and hence the weakness of the specimen will be shown wherever this weakness may occur. In cross-bending tests, where the bar is loaded in the middle, the tendency to break is greatest at the center where the load is placed, and if a flaw occurs near one end it would not be discovered by the bar rupturing at that point. Hence we may say that the tension test is a better test to discover any possible flaws which may be in the specimen, but the cross-bending test is probably better for determining the strength of the metal, since in the latter case the rupture must occur near the center of the beam, and if this portion of the beam be free from flaw, the true strength of the metal is determined. It is also much easier to make a test of cast iron in cross-bending than in direct tension, and furthermore a cross-bending test furnishes the means of determining the toughness of the iron, and, therefore, cross-bending tests may be taken as a standard method of determining both the strength and the toughness of the iron.

The most convenient form for a test specimen of cast iron for cross-bending is a rectangular cross-section about 24 inches long. The size of the cross section should have some relation to the thickness of the webs or parts in the structural forms into which the metal is run, and for the strength of which the tests are made. Thus, if the iron is to be used in forms where the thickness of the metal is about one inch. the test specimen should be made about one inch square. If, however, the metal is to be used in parts the thickness of which is not more than one-half inch, then it would be well to make the test specimens one-half inch thick and perhaps 1½ to 2 inches wide. In the case of stove iron the test specimens should not be more than ½inch thick, and about 2 inches wide. The length of the specimen is immaterial, and should be such a length as is adapted to the testing machine or apparatus. The cross-section of the test should, of course, be uniform from end to end; that is to say, of the same size throughout.

The same care should be taken in the molding and casting of test specimens as would be taken in any regular casting where sound and perfect work is desired. It would usually be cast horizontally, but with due precaution as in the interception of the slag, in the escape of the air, in the smoothness of the sides, and the perfection of the corners. It should be so molded as to free itself readily from the sand and should be tested without planing down. In testing such a bar it should be supported on knife edges near the ends, these knife edges being at a definite distance apart. The distance between these knife edges being the length of the beam, so far as the test is concerned. Any overhanging ends of the specimen beyond the bearings having no effect on the strength of the beam. This specimen is then broken by placing a load at the center, preferably by means of another knife edge, and this load applied slowly and uniformly, and without shock. About the only way to do this properly is by means of a screw turned steadily and very slowly.

There are various cross-bending testing machines on the market. The modulus of rupture of cast iron in cross-breaking corresponds to the tensile strength of the iron, and if the iron were perfectly elastic up to the point of rupture this modulus of rupture would be the same as the tensile strength in pounds per square inch, but since cast iron takes some permanent set before it breaks, the theoretical formula no longer applies, so that the computed modulus of rupture as determined from cross-breaking tests is found to be always very much larger than the true tensile strength of the cast iron; its average value being from one and one-half to twice as much as the strength per square inch in tension. If the cast iron has a tensile strengte of 20,000 pounds to the square inch, its modulus of rupture in cross-bending will be therefore from 30,000 to 40,000 pounds.

After giving the formula for finding the modulus of rupture from a cross-breaking test, the paper passed to resilience, which was defined as the toughness or the ability of the material to resist a shock or blow. It is not strength, neither is it deflection, but it is a property representing these two qualities combined. Thus, if the total breaking load is multiplied by the total deflection of the beam, and this product divided by two, the result is the resilience of the beam in inch-pounds, provided the load was measured in pounds, and the deflection in inches. The rule given was to multiply the breaking load in the middle of the beam by its deflection at the time of rupture, and divide the product by twice the weight of the beam in pounds. The result should be not less than 20 for ordinary cast iron, and may be as high as 50 for the best quality of refined cast iron, such as is commonly known as gun metal. For a very good quality of machinery castings, or such as should be used in railroad work, car construction, car wheels, and the like, where the metal is subjected to severe shocks and blows, a result obtained as above of not less than 30 should be required. For stove iron a result not less than 40 should be specified.

It must be noted that both the strength and the resilience can be determined from the same test. Having measured the length, breadth, and height of the bar, and determined the breaking load, we can compute the breaking strength. Also having weighed the bar, and determined its breaking load and its deflections, the resilience in inch-pounds per pound of metal can be determined, so that a single test in cross-breaking fixes both the strength and the resilience or toughness of the iron. It must not be forgotten that these two qualities are entirely distinct, and must not be mistaken the one for the other. Thus, one mixture may be very strong and brittle, and another comparatively weak, but very high in resilience. It is not impossible, however, to obtain both great strength and high resilience from the same mixture, and this of course is the ideal kind of cast iron. Such iron offers the greatest resistence both to dead loads or heavy strains, and also to such shocks and blows as it may receive either in actual practice or from some accident.

Because the resilience of cast iron has not heretofore been commonly studied, or even thought of as a measurable property, is no reason why it should not be carefully examined into. This term is now coming into common use, and practical men must accustom themselves to its use and understand its meaning.

Analysis of Foundry Iron.

A paper by Wm. B. Molin was read by James S. Stirling as a further contribution to the discussion on chemical and physical tests in the foundry. We give the substance of it below:

Mr. Keep's paper read at the meeting in February was thoroughly and exhaustively discussed by several metallurgists at the subsequent meeting in March; and as his last paper is no improvement upon the first one, it would be only a waste of time to discuss this paper at any length, or in detail. The subject which has for some time been under discussion will hardly be furthered by philosophizing. There is little philosophy in the manufacture of iron. The founders have asked for the facts, and being now in possession of them, it only remains to apply these facts on a scale befitting the founder's advanced ideas and the *fin de siecle*. Owing to their lack of technical knowledge the founders have for a whole century been compelled to submit to the prescriptions of the wily blast furnace man; but is it not now high time that matters were reversed, or at least evened up a little? It is certainly very strange that of all manufacturers, the founder should insist upon being the only one who is unable to decide for himself what materials will suit him best, technically and economically.

When Mr. Keep advises the founder to purchase irons by fracture instead of by analysis, and in support of his advice refers to

certain analyses presented in his paper, he only more forcibly demonstrates the great benefit to the founder of having analyses of irons made. For example, the irons in Series III containing nearly 5 per cent. silicon, which iron was purchased on the "cut and try" plan as No. 2 "grade." Now, an ordinary No. 2 iron bought on this plan is supposed to carry little or no scrap for ordinary foundry work, whereas the analysis tells you about the silicon, by the intelligent use of which you are enabled to lower the cost of your castings by nearly one dollar and a half per ton. It is also of almost daily recurrence that founders purchase irons that are actually worth much less to them than their available scrap, sprues or remelts, which you must admit is a direct loss.

Another illustration of the advantage of analysis of irons is furnished by Mr. Keep in his Series I, comprising irons so abnormally low in carbon, that the correctness of the analyses may be questioned. Acknowledging the great value of carbon, Mr. Keep must admit that these particular irons are worth less than other irons of same composition, save more carbon. The iron seems to have been made "cheap" on purpose, and they are by no means low in sulphur, either. It now ought to be pretty clear to the founders that the views held by Mr. Keep as to the relations between composition and physical properties are quite different from those held by metallurgists.

In further support of the correctness of our views I will quote Prof. Turner, one of the best known authorities on foundry practice, who says, "There is a suitable proportion for each constituent present in cast iron, and this proportion depends upon the character of the product which is desired, and upon the proportions of the other elements present in cast irons." Prof. Turner found from a most elaborate and careful series of experiments that cast iron which possessed the maximum of the desired qualities contained of graphite 2.60, silicon 1.42, phosphorus 0.40, sulphur 0.06, and manganese 0.60 per cent., and further states that strong castings could not be made if there was much increase in the amount of phosphorus, sulphur and manganese.

Mr. Wood, a foundry expert of great authority, makes the following statement: "I may say with satisfaction that by care in selecting the iron before going into the cupola, I have been able to raise the strength of the soft iron to about 29 cwt., while by reducing the silicon and increasing the combined carbon, I can rely upon casting bars out of the ordinary run of metal from the cupola up to 31 cwt. or more. These results have been obtained over several months working out of cupolas running from 60 to 70 tons per day." Mr. Wood also gives the exact per centage of the combined carbon which will impart the greatest strength, and states that he has thus been able to increase the strength more than 40 cwt., which is more than Mr. Keep has produced. The same has been the experience of many others.

In conclusion, a word about the grain of irons. Mr. Keep asserts that irons of an open grain are always the "best," because he thinks that they are made at the highest temperature. Now, those who have had experience in blast furnace practice can tell you that pigs of widely different grain are frequently obtained in the same cast, and that the grain is very much dependent upon the rate of cooling in the pig beds. Indeed, at some furnaces it is almost the rule to obtain pigs of different grain in the same cast. It has also been noticed that a slow-running iron obtains a more open grain that a quick-running one; but nobody would say that a slow running iron were better than a fluid one. In fact, a high temperature is more conducive to a more complete reduction of the silicon, which element, as we know, has a tendency to expel carbon and to close the grain. Neither is the "best iron," as the term is understood by Mr. Keep, the best for all purposes. Mr. Keep states that the carbon in molten iron is always in the combined state, and yet he is at a loss to account for its existence in irons after solidification.

If the cooling of the pigs were sufficiently slow, there would be little or no carbon left in the combined state, and it is by no means necessary that the carbon should be "in excess" in order to separate out as graphite. The amount of combined carbon in irons is on the whole of no great concern to the founder, as long as there is enough of total carbon, as the proportion in the castings can be easily regulated by the intelligent selection and use of irons.

In examining Mr. Keep's tables it will be noticed that as a rule, there is an increase in strength of the test bars, as there is a decrease of the silicon in the irons used. If Mr. Keep had had his test bars analyzed for carbon, he would have found that the increase in strength was mainly due to an increase of this constituent.

And in the exceptional cases where there is an increase in strength, with a smaller amount of combined carbon, determinations of the specific gravity will inform us that the increase is due to a more solid material, other conditions being alike.

In referring to the abnormally low carbon iron 794, Mr. Keep again demonstrates—unintentionally, of course—the absurdity of purchasing irons by fracture, and the necessity of having them analyzed, if satisfactory results are to be obtained. An analysis of the iron will tell us before using that it is an iron with high shrinkage, as well as explain the reason why it has this tendency, whereas Mr. Keep's "mechanical analysis" will only tell you that the mixture you are running through your cupola, consisting perhaps of half a dozen "standard brands," is bad without giving you any information about the real cause.

Here is another instance of choice between chemical analysis as a preventive, and Mr. Keep's "mechanical analysis" as a sort of post mortem recorder of dead loss.

Mr. Flagg read extracts from a letter from Mr. W. J. Keep, enclosing another letter from "an undoubted authority on testing," whose name he would not divulge. The gentleman declared that he entirely agreed with Mr. Keep as to the superiority of the physical test over the chemical test.

At this juncture Mr. Wanner introduced the following preamble and resolution:

"WHEREAS, the present strike of coal miners of this and other States greatly intensifies the already calamitous condition of manufacturers and their employes, adding to suffering and want a greatly advanced cost of fuel, therefore,

Resolved, as the sense of this meeting that we regard the strike as unwarranted, in the present condition of trade, and that being waged without the slightest hope of success, it should be terminated forthwith, and that the owners of coal mines should be permitted to operate their works by the efficient aid of the several State authorities without further delay or sentiment."

Mr. Wanner said: While we can get coke we pay twice as much for it. It seems to me, the sooner business men get rid of sentiment and stop permitting others to fight their battles, the better for them. We should all stand together. The laboring man has a right to certain wages, and he may stop work when he pleases, but he has no right to stop others."

Mr. Devlin: "It seems to me that the men are being oppressed in this case. The men are poor, and on that account are being treated with injustice. I understand that they have been cut down from 55 cents to 35 cents. Why? What good comes of it? The operator who cuts down first offers his coal five or ten cents cheaper than his competitor. The latter cuts also and so on. The miners are unjustly treated; Their work is dangerous and hard. I think, in passing a resolution, if one is to be passed, we should ask for justice for the men as well as others."

Mr. Flagg: "I heartily endorse what Mr. Devlin has said."

Mr. Wanner: "No matter what our sympathies may be, they do not enter into this question. No matter how greatly oppressed the men may be, we can't help that Business and not sentiment should actuate us. No matter how our hearts may go out to these men we can't help them; but will only hurt ourselves and others. It is a hopeless strike at this time. A strike can't succeed on a declining market."

Mr. Matlack: "The question is, shall the men be permitted to seize works with impunity?" Mr. Brown agreed with Mr. Matlack, as did also Mr. Riehle. The resolution was put to the meeting, and carried by a close vote. The meeting then adjourned.

SHOP AND FOUNDRY NOTES.

We have all known the mechanic who spent most of his time in explaining why his work was not just as it seemed desirable to have it, and the manager of industrial establishments whose utter failure to really manage anything was due to the per-

versity of employes, the ignorance of his employers, or everything and anything, in fact, except his own unfitness for the place. Such men are typified by the young man who stated as his reason for not dancing: "I should like to dance, and I should dance, only the music puts me out and the girl gets in my way."—[American Machinist.

In the new factory which A. Clements the French bicycle manufacturer is to erect, the equipment will be chiefly American machinery and tools. The contracts which M. Clements closed in this country on a recent visit amount to $300,000, the largest being for a ball-making plant, to be furnished after the Grant patents, by the Cleveland Machine Screw Co.

Arthur O. Ferris recovered $2,750 from the Berlin Machine Works, of Beloit, Wis., for injuries received through an imperfection in a machine he was operating.

Industry, of San Francisco, speaking of the machinery display at the Mid-Winter Fair, confesses to disgust at seeing "well made machinery covered with glistening paint and varnish, showing every pin hole and dentation of surface in the castings." Our contemporary adds: "It has long been canventional with makers of good machinery to paint it with lusterless paint of a color called steel, and as near to that of cast iron as possible. This causes the castings to look smooth, harmonizes with finished parts, and permits accurate photographing. * * * Steel-colored lusterless paint and 'filling,' which is the same thing in a stiff paste, has by common consent become a sign of good taste and good work. Many years ago Messrs. William Sellers & Co., at Philadelphia, made experiments to determine how their machines could be properly photographed. All reflection had to be avoided. That was obvious; so the machines were lime-washed with different tints, which succeeded, but was a good deal of trouble because the wash had to be removed and substituted with paint. Mr. Tully, a paint maker in Philadelphia, took up the matter, and after a long train of experiments produced a lusterless paint that resisted animal oils, and with a good pigment lasted for years without change of shade. It also became as hard as iron and was applied to castings as soon as cleaned and before working them."

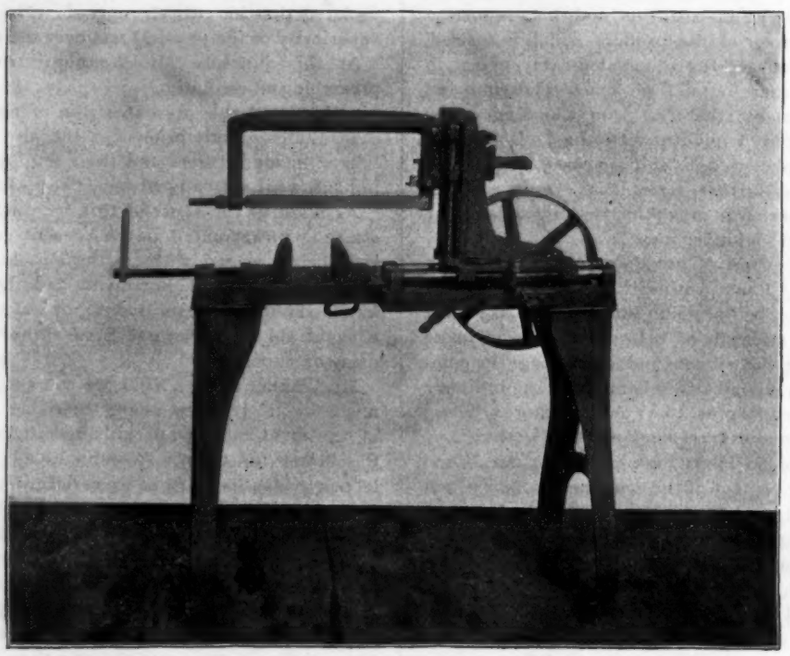
THE Manufacturers' Tool Supply Co., 17 S. Canal st. Chicago, say that their business was 50 per cent. larger in May than in April, and that while the next two or three months are usually very dull in their trade, the indications at present point to a fairly large business for that time.

THE Carnegie steel works at Duquesne will shut down Saturday for six or eight weeks, and the new blooming mill will be built meantime, a new engine put in and furnaces repaired. About 2,000 men will be thrown idle.

THE Q. AND C. METAL SHOP SAW.

There has been a very large demand in the past few years for improved machinery for the quick cutting of metal. For small work there has been a very large sale of machines, commonly called "hack saws." All of those made up to the present time have been a gravity feed, necessarily slow, with a decreasing speed as the size of the metal increased. Another disadvantage has been in expense; the hack saw being of short life. In view of this, the new shop saw designed by the Q. & C. Company will undoubtedly meet with favor. It is guaranteed to do three times as much work as any power hack saw, and the claims are made that it will save its cost in saw blades alone in from two to four months, and that each saw blade will outlast six ordinary-sized hack saw blades.

The machine is designed especially for shop use, and will cut all kinds and sizes of material up to six inches in diameter. It has a positive feed, which is entirely automatic, and its speed can be instantly changed to accommodate hard or soft metal, large or small. It has an automatic screw feed adjustable to all kinds of work, allowing the same cutting speed to be maintained throughout. On the old style machines, the saw blade drags backward on the work with nearly if not quite as much pressure as when on its forward movement, which dulls the saw very rapidly. The Q. and C. saw frame having a perfectly horizontal motion, does not drag back on the work, thus saving 50 per cent. of the wear and insuring perfectly square work. It has a movable vise, allowing the entire length of the blade to be used. It is especially simple in construction and has an automatic stop. The saw is manufactured and sold by the Q. & C. Company, 703-706 Western Union Building, Chicago, and 29 Broadway, N. Y.



THE Q. AND C. METAL SHOP SAW.

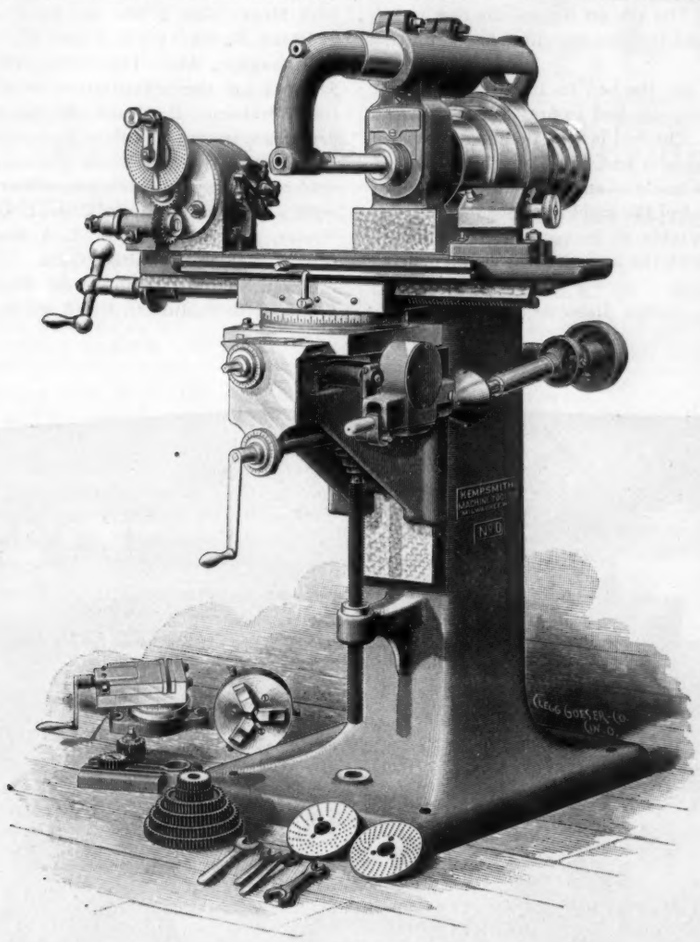
British Mineral Industry's Decline.

It seems to me that the remarkable decline that overtook our mineral industry during the year 1893 should have commanded more attention than it appears to have done, both because of its own serious character, and because it opens up prospects for the future that can hardly be regarded with complacency. The total decline in our mineral production in that year, as compared with 1891—which, however, was, no doubt, an exceptionally good year—amounted to not less than 23 millions of tons, and this involved the employment of fully 11,000 fewer hands than were employed in the year 1891. The most serious falling off appears, of course, in the output of coal, which was 21 millions of tons less in 1893 than in 1891, and there was a further drop of 1½ million tons in our production of iron ores, of which we only produced in the latter year 11⅛ million tons, whereas about ten years ago we were annually turning out nearly seven million tons more than that quantity.—[London Iron and Coal Trades Review.

UNIVERSAL MILLING MACHINE.

The two illustrations presented in this connection give an idea of the special features of a universal milling machine, catalogued by the Kempsmith Machine Tool Co. as No. 0. It was designed with reference to the finer kinds of tool makers' work, and yet is rigid and strong enough to take a heavy cut when required.

The general design conforms to standard practice, but the foot stock is of a design peculiar to this and other machines by the same builders, while the spiral head is made on new lines entirely. The table of the machine can be swiveled to any angle, and it has automatic feed with automatic trip.



UNIVERSAL MILLING MACHINE.—FIG. 1.

The feed has four changes, and is tripped automatically, or by hand, under full cut, as easily as when the table is running light. A full range of spirals, right and left-hand, can be cut from one turn in 1 inch to one turn in 100 inches, by both simple and compound gearing. For every-day practice, the range of simple-geared spirals is sufficient, and the gears are as readily changed as on an ordinary screw-cutting lathe.

The spindle is of forged crucible steel, hollow its entire length, and the front end threaded, and hole tapered, so that arbors and chucks, fitting spiral head, will interchange with main spindle.

The spiral head is so arranged that the elevation of its spindle to or near the vertical position raises the work as little as possible above the platen, and the arc through which it can be rotated in a vertical plane is 210°. It can be used on either end of the table. The motion is imparted to the worm (for spiral milling) through the medium of helical gears, whose end thrust, as well as that of the worm spindle, is taken by steel balls running on hardened steel surfaces. Fig. 2 is an enlarged view of the same head, as made plain, *i. e.*, without the gearing for rotating the spindle by power. This design of head is believed to secure accuracy, and at the same time great rigidity and strength. The spiral head spindle is also hollow.

The cone pulley has its smallest step towards the front, which permits the top of the column to slope toward the front spindle bearing, bracing it and securing rigidity. The two spindle bearings are tied together by an arch at the top, which also supports the overhanging arm. A bearing 9 inches long is bored in the arch, slotted at the top, and provided with two clamping screws. The arm can be quickly inserted, clamped fast, and as quickly removed.

The spindle boxes are of bronze, made in halves. They are cylindrical in form, with a deep rib running around the middle, faced square with the turned surface, and forced into a groove cut into the column and box cap. The outside of the box is finished entirely in the lathe, which makes its reproduction, when worn out, a simple matter. The elevation to the knee and the cross-motion is indexed to read in thousandths of an inch. The foot-stock of centers has valuable features in the placing of the center, so that shank or end-milling cutters can be used as close to the inner side of center as to the top. This feature dispenses largely with the use of extremely small cutters, and increases the quantity, and improves the quality of work that can be produced on the machine. Adjustment to take up wear is provided wherever lost motion would affect the accuracy of the machine.

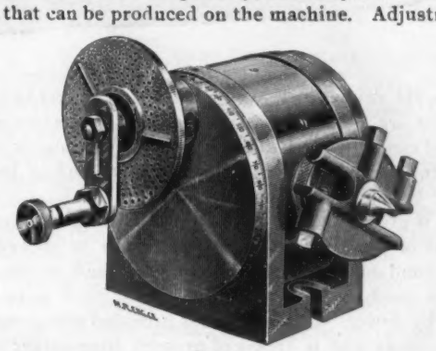


FIG. 2.

The vertical adjustment of the knee is 14½ inches; in-and-out movement of platen (in line with spindle), 4½ inches; automatic feed 18 inches; length of platen, including oil-pans, 33 inches; diameter of work taken on centers, 8¼ inches; length between centers, 14 inches; size of front spindle bearing, 2 inches by 3¾ inches; weight of machine, 1,200 lbs. It is made by the Kempsmith Machine Tool Co., Milwaukee, Wis.

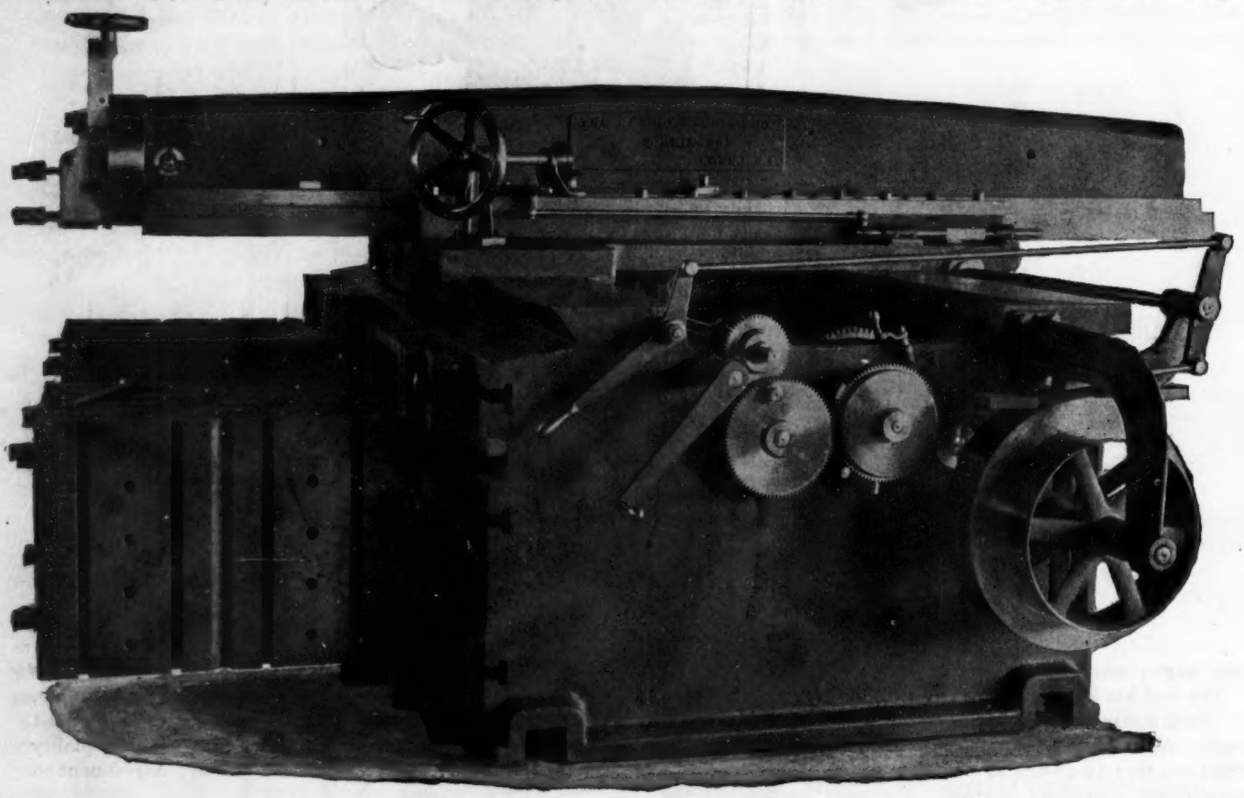
A 20-TON SIX-FOOT SHAPER.

An unusually large and heavy shaper, built by the Hendey Machine Co., of Torrington, Conn., for planing parts of heavy punching and shearing machines is shown in the accompanying half tone. The entire weight of the machine is 40,000 pounds, yet notwithstanding its great weight and size it is so arranged as to be under easy control of the operator. The stroke is six feet and the movement of the saddle upon the bed is also six feet. The ram, exclusive of the head, is 12 feet 8 inches long, is 3½ inches thick under the caps which hold it to the saddle, is 20 inches wide at bottom, and has a bearing in the saddle 60½ inches long. The rib on top of the ram is 20 inches deep, 7 inches thick, and the ram weighs 3,814 pounds, or nearly two tons.

The saddle has a bearing on the bed 60 inches long, and from front to rear its bearing on bed is 61½ inches. The saddle weighs 4,565 pounds. The bed is 67½ inches wide over all, stands 42 inches high, and is 11 feet long, weighing 16,750 pounds. It can, of course, be made of any desired length.

The two aprons on the front of the machine are 36 inches by 36 inches, and each carries a table 36 inches long, 30 inches wide, and 24 inches deep. With the aprons these weigh nearly 5,000 pounds each.

The driving pulleys are 24 inches diameter and carry 2½ inch belts, the driving belt having a speed of 96 feet to 1 of the ram. Belts are shifted one after the other, the same as in a planer and can be shifted either to reverse the ram or stop it at any point by means of the lever shown at end of bed and connected to shifting mechanism.



A SIX-FOOT SHAPER.

Motion is given the ram through the medium of a cut rack and pinion of 5 inches face. The saddle can be moved from the right hand end of the machine by hand, and on the other end of the machine is a set of pulleys to move it in either direction by power. The machine is provided with power feed in all directions, and is arranged to work from either end of the bed. The hand wheel on the saddle is to move the saddle by hand when setting tools to the work. The head has automatic down feed controlled by the small lever shown just back of the head on the cutter bar.

The weight of the tables in front rests upon ball thrust bearings and the thrust of the screw for moving saddle is taken in the same way. All important bearings on the machine are bushed with hard phosphor bronze, and all shafts and screws are of steel.

INDUSTRIAL SUMMARY.

New Enterprises:—

The following recent incorporations, specially reported for *The Iron Trade Review*, are of interest to the iron and machinery trades:

Geneva, Wis.—The Lake Geneva Mfg. Co.; capital, $5,000; for the manufacture and sale of machinery; incorporators: H. A. Arnold, J. B. Simmons, R. B. Arnold, S. S. Arnold. Address letters care of J. B. Simmons, Lake Geneva, Wis.

Peoria, Ill.—The Meyer Furnace Co.; capital, $50,000; to manufacture and sell furnaces; incorporators: Frank Meyer, Dirk Meyer, Geo. F. Meyer, Geo. Harms. Address letters care of Frank Meyer, 1313 S. Adams st., Peoria, Ill.

Milwaukee, Wis.—The Orvis Steel-Arch Mfg. Co.; capital, $25 000; for the manufacture of Orvis' steel-arch furnaces; incorporators: F. Kraus, R. Nunnemacher, H. Smith. Address letters care of Robert Nunnemacher, Milwaukee, Wis.

Hamilton, O.—The Ryan Dynamo Co.; capital, $10,000; for manufacturing and dealing in electrical machinery and apparatus, etc.; incorporators: Chas. L. Cornell, J. M. Beeler, E. G. Ruder, Jno. B. Cornell, Jr., L. A. Becker. Address letters care of E. A. Belden, Hamilton, Ohio.

Grand Rapids, Mich.—Sweet Electric & Mfg. Co.; capital, $100,000; to manufacture and sell machinery and electrical appliances; incorporators: Chas. C. Kritzer, Samuel Barnes, D. Fred Smith, all of Grand Rapids, Mich. Address letters care of Chas. Kritzer, Grand Rapids, Mich.

Chicago, Ill.—Hess Warming & Ventilating Co.; capital, $10,000; to manufacture and sell apparatus for warming, ventilating and cooking purposes; incorporators: Geo. H. Hess, Geo. H. Hess, Jr., Chas. J. Petermann. Address letters to Hess Warming & Ventilating Co., 63 Washington st., Chicago, Ill

Kalamazoo, Mich.—G. T. Eames & Co.; capital, $15,000; to manufacture and sell twist drill grinders; incorporators: Wilfred Eames, Ann Arbor, Mich.; Gardner T. Eames, F. V. Eames, Kalamazoo, Mich. Address letters care of G. T. Eames, Kalamazoo, Mich.

Chicago, Ill.—McDermid Mfg. Co.; capital, $5,000; for the manufacture and sale of annunciators and all forms of electrical specialties and appliances; incorporators: Albert R. Warner, Frank Hamlin, Wm. C. Boyden. Address letters care of Hamlin, Holland & Boyden, 107 Dearborn st., Chicago, Ill.

Bellevue, O.—The Bellevue Fence Co.; capital, $20,000; for

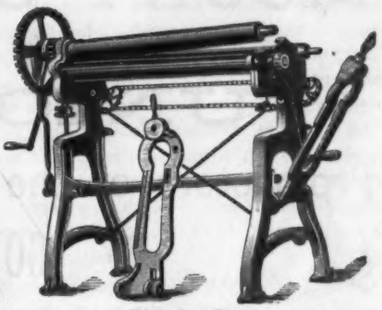
MACHINES FOR WORKING SHEET METAL

Patent Gap Shears, Especially designed for Squaring, Trimming and Slitting. 6 to 18 inch throat for Slitting Wide Sheets Complete for Tin or Iron to 14 gauge. Seven Styles of various lengths HAND AND POWER

Patent Gap Shears.

General Purpose Punch and Shear. Seven Sizes.

Rear Side.


Forming Rolls.

General Purpose Forming Rolls, all sizes. Quickly adjusted and instantly opened—A Revolution. Also Patent Crimping Rolls. Beware of Infringements.

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FIRE BRICK, FIRE CLAY,

For Blast Furnaces, Cupola Lining, Boiler Setting, Smoke Stack Lining, or Any Other Purpose.

EVERY CLASS OF SPECIAL SHAPES AND SIZES.

ALL KINDS OF

Foundry Supplies.

FACINGS, BLACKINGS AND MOULDING SANDS

Of All Kinds.

manufacturing aud constructing wire, metal and other kinds of fences, selling territorial rights, etc.; incorporators: Daniel W. Aylworth, A. B. Smith, F. W. Gunther, Geo. W. Doty, John P. Marlow. Address letters care of D. W. Aylworth, Bellevue, O.

Cleveland, O.—The Superior Stove & Furnace Co.; capital, $10,000; for the manufacture and sale of stoves, furnaces and general house furnishing goods; incorporators: Geo. Zeller, Wm. H. Switzer, Myron M. Sheingold, Geo. Schindler, Walter J. Hamilton. Address letters care of Walter J. Hamilton, Cleveland, O.

Chicago, Ill.—Masterman Supplementing Air Brake Valve Co.; capital, $1,000,000; to manufacture and sell the Masterman supplementary air brake valve, etc.; incorporators: James B. Safford, A. T. Buchanan, Wm. H. Masterman. Address letters care of J. B. Safford, 702 Rialto Bldg., Chicago, Ill.

Peoria, Ill.—Peoria Automatic Filter Co.; capital, $50,000; for the manufacture and sale of filters, machinery and merchandise, purchase and sale of patents and patent rights; incorporators: Deloss S. Brown, Austin F. Johnson, Geo. G. Geiger. Address letters to Peoria Automatic Filter Co., Peoria, Ill.

New Castle, Pa.—New Castle Galvanizing & Chemical Co.; capital, $10,000; for the manufacture of iron or steel or both of any other article of commerce from metal or wood or both; incorporators: Frederick Lehberger, Herbert Capewell, Daniel R. Jenkins, all of New Castle, Pa. Address letters care of Frank A. Blackstone, New Castle, Pa.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

The Standard Range Co., of Evansville, Ind., have leased a part of the old Scantlin foundry, the proprietors of which will make castings for the new company. Operations have been delayed by the non-shipment of material, but it is expected that orders will be filled July 1.

Bates & James, of Cuyahoga Falls, O., write that they are in the market for one 40 h. p. stationary boiler, one 25 h. p. horizontal engine, a 20″ lever and screw feed drill press, an engine lathe from 12″ to 18″ swing, a planer and matcher, a mortising machine, a tenoning machine. All the above to be new or good second hand. The same firm will also want pulley hangers and shafting.

The Standard Metal Lath Co., of 45 W. Lake st., Chicago, are now ready to fill orders for their product. They emphasize its rigidity, the fact that it is a perfect key for the mortar, that it is economical of mortar, can be properly finished in two coats and that each sheet is given a coating of prepared oil, which hardens and prevents rust while the mortar is wet. The company are in the market for sheet steel.

New Construction:—

The Kelly Axe Mfg. Co., of Louisville, Ky., are pushing to completion a new plant of a greatly enlarged and improved capacity.

After years of waiting and much talking a practical business organization has been effected in Alabama for building a large steel plant at Bessemer. Mr. H. F. De Bardeleben, one of the pioneer iron men of that State, to whose abilities as an ironmaster great credit is due for the remarkable record that is now being made by furnaces designed to produce 150 tons of iron a day that are now making about 240 tons a day, is at the head of this enterprise. Mr. A. M. Shook, of Nashville, Tenn., also one of the foremost iron men of the South, will be one of the managers of this enterprise. The Bessemer Land & Impravement Co., which has elected Mr. DeBardeleben president, has decided to build a steel plant with a capacity of 300 tons of slabs and billets per day, with a view to the output being worked up by the Birmingham, Gate City and Bessemer rolling mills. The cost of the plant is not yet fully known, but Mr. De Bardeleben writes that they have ample means with which to build a first-class modern plant. The plans will be prepared and the work of construction will be vigorously pushed.—[Manufacturers' Record.

Additions, Enlargements, Removals, Etc.:—

Champion Blower & Forge Co., of Lancaster, Pa., are running their works to the utmost capacity and are planning for further extension of their premises in addition to the enlargement made a year ago.

In order to give more room for the manufacture of their hardware specialties, and because Stamford, Conn., is not an advantageous point from which to reach the trade for their cranes, the Yale & Towne Mfg. Co. are considering the removal of their crane works to some other point. Overtures have been made to parties in Pittsburg and Cleveland on the subject. Cleveland presents excellent shipping inducements and can doubtless make as advantageous an offer as to site, as any city in the country.

The works of the Heath Rail Joint Co., at West Superior, Wis., have been operated for about a year, making the Heath rail joint. It has been furnished to 56 different railroads during that time. The production has been in the neighborhood of 75,000 joints, of which number about 25,000 have been made in the last six weeks. The company are now building a new factory at Chicago Heights, and will move into it in about 60 days, or as soon as the new machinery is finished, which is under contract. The new factory will have a much larger capacity than the one at West Superior.

Fires and Accidents:—

Fire at Youngstown destroyed the buildings of the Youngs-

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick.

GOVERNMENT ⁂ STANDARD.

Established 1841. Capacity, 60,000 Per Day; 18,000,000 Per Year.

The First Manufactory of its Kind in the U. S.

Home Office and Works:—MOUNT SAVAGE, Allegany County, Md.

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Fire Brick.

High Grade Fire Brick for Melting. Heating and Blast Furnaces.

CUPOLA LININGS, BOILER SETTINGS AND ALL PURPOSES FOR WHICH FIRE BRICK ARE USED—ALL SHAPES.

Ground Clay in Bulk or Sacks. Send for list of shapes.

THE AMERICAN FIRE BRICK & CLAY CO., Mineral Point, Ohio.

THE S. T. W. EJECTOR.

SIMPLEST, BEST and CHEAPEST PUMP made.

SEND FOR CIRCULAR.

James Jenks,

199 JEFFERSON AVE.,

Detroit, Mich.

town Stove Co. leased to Robt. Poultney for pattern works. Loss, $10,000.

The iron foundry of B. P. Blanton & Co., at Griffin, Ga., was damaged $25,000 by fire.

The foundry of the Fisher-Leaf Co., at Louisville, Ky., was destroyed by fire; loss, $10,000.

E. Arth & Co., proprietors of a brass foundry, at 32 Columbus st., Cleveland, lost $2,500 by fire June 7.

The Aschman Steel Casting Co.'s works at Sharon, Pa., were damaged to the extent of $2,500 by fire, June 2.

Fire starting from the gas producers of the furnaces, caused $75,000 damage at the extensive nail mill of Ellis & Lessig, at Pottstown, Pa. The loss is chiefly on nail-making machinery.

The Cleveland Facing Mill buildings of the Variety Iron Works, located on the Flats, Cleveland, burned Monday evening, June 11, with $30,000 loss. They will be rebuilt at once. The fire communicated to the upper portion of the machine shops, which are 46x113 feet, and the roof and supporting timbers were burned, but the interior and machinery were not damaged. About 175 men were employed in the facing mills.

General Industrial Notes:—

The Frankton Iron Co., of Frankton, Ind., were the first to sign the Amalgamated scale.

It is announced that the Pennsylvania Railroad Co., will not build a branch road to the Johnson Works, at Johnstown, Pa.

The Enterprise Mfg. Co., Columbiana, O., have embarked in the boiler business, and converted the old nut and bolt factory into a boiler works.

At the Hubbard, O., co-operative rolling mill, all the pig iron on hand was manufactured into muck bar last week, and the mill shut down indefinitely.

The Arethusa Iron Works, at New Castle, Pa., have an abundance of natural gas and are kept running double turn with orders sufficient to keep a full force of men busy for some time.

The rod department of the Beaver Falls Mills, Beaver Falls, Pa., has shut down for repairs. During the period of idleness some improved machinery will be introduced which is expected to materially lessen the cost of production of rods.

The business of the Ball & Wood Co., Elizabeth, N. J., has so far recovered from the general business depression that they find it necessary to increase their force by the addition of a night gang, running to their full capacity 24 hours a day.

Seaman, Sleeth & Black, proprietors of the Phœnix Roll Works, at Pittsburg, with the exception of a few days last Fall, have been running their plant single turn right along through the business depression, without having to stop for want of orders.

The negotiations for a settlement of the affairs of the Madison Car Works, which have been under consideration for the past several months, have resulted in the acceptance of the offers made the creditors, and the works will be reopened for business within 30 days.

The directors of the Pennsylvania Steel Co. voted June 8 to approve the new plan of reorganization and the stockholders and creditors will be asked to vote upon it. The committee on reorganization is E. B. Morris, chairman; N. Parker Shortledge, J. B. Gast, George Fitler and Howland Davis.

Upwards of 200 tons of foundry iron is being shipped daily from Andrews & Hitchcock's furnace yards at Hubbard, O., and an impression is gradually being made on the 18,000 tons of iron that was in stock when operations ceased. Men are now at work at No. 2 furnace blowing out the salamander. The stack will be rebuilt from the ground.

T. J. Peters has been appointed receiver of the Alabama Iron & Steel Co., of Brierfield, Ala., on the application of the secretary of the company The company was chartered in 1889 with a capital stock of $2,000,000, and bought out the old Brierfield Iron Co. In 1892 the company gave a mortgage for $2,000,000 on the entire plant to the Central Trust Co., of New York.

Reidhard Mannesmann, proprietor of extensive seamless tube works in Germany, expressed himself well satisfied with the advantages of Youngstown, O., as a site for the industry he intends establishing in the United States. It is expected that about $1,000,000 of capital will be put into the enterprise and if Youngstown is chosen, capitalists there will take a portion of it.

Wm. Tod & Co., of Youngstown, O., have received a contract from Pickands, Mather & Co., of Cleveland, for a blowing engine to be used at the Alice furnace, which the latter company are rebuilding at Sharpsville. The contract is to be completed by July 31. Together with that order, Wm. Tod & Co. have a large force of men at work on a pair of engines for the Brooklyn Electric Illuminating Co., of Brooklyn.

At Ironton, O., the *Register* says, the Kelly Nail Works are idle, and of the charcoal furnaces in that vicinity Sarah is the only one active, its output being 100 tons a day. Foster's foundry is running two days each week, principally to give the employes something to do. The Eagle mill is off, for want

of fuel. Belfont mill was preparing to start when the strike came on. Some steel on hand was shipped back to Ashland, Ky., to the Norton Iron Works.

President Garland, of the Amalgamated Association, has been in Cleveland trying to adjust the trouble between the Lake Erie Iron Co. and some of its employes who went on a strike several months ago. The strikers, who refused to accept one-eighth of the boiling price for rolling, when the reduction was made to $4 for boiling, were not sustained by the Amalgamated officers at the time. Some of the men will be taken back when there is work for them. At present the mill is closed on account of the coal strike.

Ohio Excursion Rates via Pennsylvania Lines in June.

To Delaware, June 24th and 25th, for the Teachers' Association meeting. Return coupons valid until June 30th, inclusive.

To Akron, account State Epworth League meeting, June 25th and 26th, good to return until June 29th, inclusive.

For particulars and time of trains, apply to nearest Pennsylvania Line Ticket Agent.

"Summer Outings"

Is the name of an illustrated pamphlet of summer resorts and picnic grounds issued by the Nickel Plate Road. Call on, or address, E. L. Browne, City Passenger and Ticket Agent, 224 Bank St., for a copy.

Seashore Excursion Over the Pennsylvania Short Lines.

Low rate round trip tickets to Asbury Park will be sold via Pennsylvania Short Lines July 7, 8 and 9, account National Educational Association meeting. Asbury Park adjoins Ocean Grove, Long Branch, Cape May, Atlantic City, Elberon, Sea Isle Park, Barnegat and other delightful watering places on the New Jersey coast, to all of which the Pennsylvania Lines form the only route comprised by one railway system. Return limit on excursion tickets will be ample for side trips. For any desired information apply to nearest Ticket Agent of the Pennsylvania Lines, or address F. Van Duzen, Chief Assistant Passenger Agent, Pittsburg, Pa.

An edition of the souvenir maps of the Y. P. S. C. E. Convention to be held July 11th to 15th, at Cleveland, O., has been issued to the Nickel Plate Road, the shortest through passenger line between Buffalo and Chicago. Any person who expects to attend this convention and desiring one of these maps can have it forwarded to his address free, with the compliments of this low rate line. Requisition should be made on the Advertising Department of the Nickel Plate Road, Cleveland, O. B. F. Horner, General Passenger Agent.

The Nickel Plate Road has had the reputation of offering its patrons low rates, but is now able to make a farther reduction to many points. Ask Nickel Plate agents.

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57 S. Canal St, CHICAGO.

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NEW AND SECOND HAND
MACHINE TOOLS.

We carry in stock a full line of
Engine Lathes,
Iron Shapers,
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Drill Presses,
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Turret Machinery.

Write for catalogue and prices. 1

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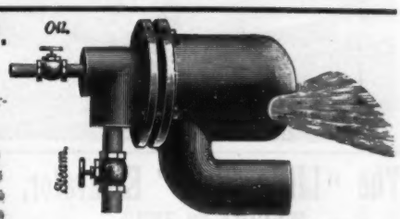

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320 and 322 Broadway, New York, N. Y.
J. POWER HELY, Chicago Manager,
1405 Monadnock Block, Chicago, Ill.

Note.—If you are using oil as fuel, and are not getting good results, we would be pleased to send you our burners on trial. The oil in our burners can be atomized by either steam or air.

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NO TAR. **ROOFING** NO TAR.

It is superior to any other roofing, and unequaled for House, Barn, Factory, or out-buildings; it costs half the price of shingles, tin, or iron; it is ready for use and easily applied by any one; it is the best roofing in the market, in durability, to all others. Send for estimate, and state size of roof.

RUBBER PAINT.

The best known paint in the world for tin, iron or shingle roofs, fences, sides of barns and out-buildings. It costs only 60 cents per gallon in barrel lots, or $4.50 for a 5-gallon tub. Color, dark red. It will stop leaks in tin or iron roofs that will last for years. It is guaranteed not to peel, crack, scale, nor wash off and is fire-proof against sparks. TRY IT.

EXCELSIOR PAINT & ROOFING CO.
155 Duane Street, New York, N. Y.

Reduced Rates to Dayton via Pennsylvania Lines.

June 20th, excursion tickets to Dayton will be sold from ticket stations on the Pennsylvania Lines in Ohio, account the meeting of the Ohio Association of Union ex-Prisoners of War. Return coupons valid until June 21st, inclusive.

AN encouraging report is received from Messrs. Dawson & Goodwin, 57 S. Canal st., Chicago, who say that their business in the past two weeks has been larger than at any time for several weeks previous. They have several deals open at the present time, that they expect to close very shortly, which will make their June business quite large.

The Summer Excursion Season.

Is now open. The Nickel Plate Road offers very low rates to many fine resorts. For information call on E. L. Browne, Cleveland Passenger and Ticket Agent, 224 Bank St.

MESSRS. Hill, Clarke & Co., 12–14 S. Canal st., Chicago, have recently issued a special list on second-hand iron and wood-working machinery at prices extremely low to fit prevailing conditions. The list contains an excellent lot of second-hand engine lathes, boring mills, upright drills, planers, shapers, milling machines, etc. Nearly all of these machines are in first class condition, practically as good as new, and some of them have never been used. The list will be mailed upon application at their office.

Linwood Park, Vermillion, O.

As a delightful Summer Resort located on the shore of Lake Erie and during the summer season from June 15th to September 20th, the Nickel Plate Road offers reduced rates to that point.

A MANUFACTURER of belting in this city is authority for the statement that at least one-half if not more of the belting sold to the hardware trade is of inferior quality. He accounts for this by the fact that but very few of the dealers can tell hemlock from oak tanning and that the present low prices have induced many of the manufacturers to take advantage of the dealer's ignorance. Even the lower grades of hemlock, he adds, are palmed off on an unsuspecting purchaser who wants the best quality of oak, but cannot tell one from another.—[Stoves and Hardware Reporter, St. Louis.

Material Reductions

in fares to local points on the Nickel Plate Road. See agents.

THE Nickel Plate Road has always sold tickets at low rates, but is now able to quote them lower. Ask agents.

Bucyrus Steam Shovel & Dredge Co.,

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STEAM SHOVELS — In Five Sizes for Railroad and Contract Work, Brick Yards, Stone Quarries, Stripping and Handling Iron Ore, Coal, Etc.

STEAM DREDGES — Of All Types and Sizes; for All Purposes; Elevator, Dipper, Clam Shell, Suction. Special Machines for Special Work.

WRECKING CARS — BOTH HAND AND STEAM. CAPACITIES 10 TO 35 TONS.

PILE DRIVERS — WITH EITHER DROP OR STEAM HAMMERS.

SOUTH MILWAUKEE, WIS., or BUCYRUS, OHIO.

The "Little Giant" Excavator.

WEIGHT 20 TONS.
CAPACITY 1,500 CUBIC YARDS PER DAY.

The only Traction Shovel on the market, and nothing approaches it for general purposes.

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Dredges and Excavators.
Write for Photographs and Descriptive Matter.
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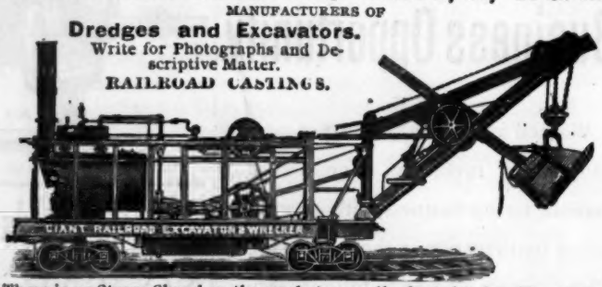

There is no Steam Shovel on the market so well adapted to handling Iron Ore as our "Giant." We guarantee 2,500 tons in 10 hours.

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Am. Crusher and Am. Ball Pulverizer.

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The Simplest, Cheapest and Best Machines in the Market. Pulverize wet or dry to any degree of fineness. Makes little or no slimes in wet nor dust in dry work. Four sizes, capacity from 2 to 60 tons per day.

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Cable Address, American.

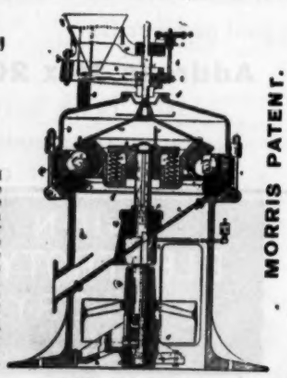
First Prize and Gold Medal Awarded by World's Fair, 1893.

Office of THE CLEVELAND IRON ORE PAINT CO. and THE GARRY IRON ROOFING CO.,
CLEVELAND, O., Jan. 25, 1894.

The American Mining & Milling Machinery Co., Cleveland, O.:

GENTLEMEN: We purchased a No. 2 American Rock Breaker and a No. 2 American Ball Pulverizer from your company about one year ago. The latter part of April, 1893, we started up for regular work, since which time we have run both of said machines to the full extent of our demands and to our entire satisfaction. The first 700 tons of hard iron ore that we pulverized for paint purposes was ground without taking the Pulverizer apart, and without expending one dollar for repairs for either of these machines. Of the 700 tons spoken of, about 200 tons was Lake Superior Specular iron ore, containing some 70 per cent. iron; a very difficult ore to pulverize. The remainder was a red fossiliferous iron ore, carrying quite a per cent. of silex, which cuts out buhr-stones rapidly. We find that the steel balls, which were when new 5 in. in diameter, now caliper 4⅞ in., and are perfectly round and smooth. The grinding track shows very little wear, and the driving track shows LESS; in fact, the wear is almost imperceptible. These two machines crush and pulverize more than one ton per hour with LESS than 12 H. P. We do not know of any Crusher or Pulverizer that can compare with the output of these two machines in quantity, quality, small amount of wear and tear, and like power. In our opinion, you cannot recommend them too highly. Very truly yours,

CLEVELAND IRON ORE PAINT CO.



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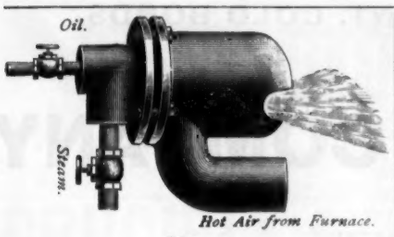
MORRIS PATENT.



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No. 6.

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CLOSE YOUR FACTORY FOR WANT OF COAL?

WHEN WE CAN RUN YOU WITH OIL FOR LESS MONEY.

. . . . ADDRESS . . . .

THE THURMAN FUEL OIL BURNER CO.

DESIGNERS, CONTRACTORS AND ENGINEERS

FOR

COMPLETE FUEL OIL EQUIPMENT.

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BRANCHES: { E. A. BOLDT, 320-322 Broadway, NEW YORK. . . . . J. POWER HELY, 1405 Monadnock Blk., CHICAGO, ILL.

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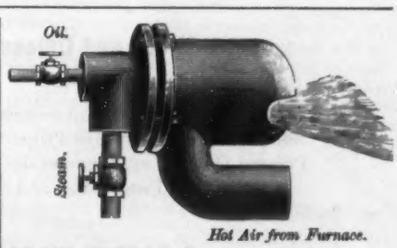

No. 4.

FIRST MORTGAGE 15-YEAR SIX PER CENT. GOLD BONDS
WITH SINKING FUND
OF THE

BLUE RIDGE IRON COMPANY

OF VIRGINIA.

BLUE RIDGE IRON COMPANY. } CONSOLIDATED.
CRESCENT IRON COMPANY. }
LILY AND CRESCENT MINES.

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TRUSTEE FOR BONDHOLDERS.

Both Principal and Interest payable in Gold Coin at the office of the Trustee, Baltimore, Md.

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Bonds Issued to Improve Mines and Increase Output.
OVER 1,000,000 TONS, ESTIMATED, HIGH-GRADE BROWN HEMATITE ORE.

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Interest Payable April and October.

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Six hundred acres; 5 ft. Average Thickness of Coal; 2,250,000 tons Famous Kanawaha Coal.
Bonds Issued to Improve Property and Increase Output, exclusively.
Present Output, 250 tons per day. Water Transportation to Limitless Markets.
Send for Prospectus, and full Description and Report of Mines.

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Established over a Century ago. Manufactory, SHEFFIELD, ENGLAND.
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WM. JESSOP & SONS, Limited.
"Medal—World's Columbian Exposition, 1893."
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CRUCIBLE STEEL CASTINGS

WHY?

Why send your PATTERNS EAST and wait FOUR WEEKS for your CASTINGS when you can get

SOLID STEEL CASTINGS

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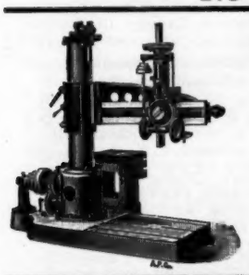

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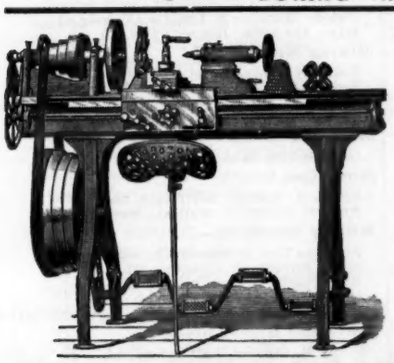
DRILLS.
BORING AND TURNING MILLS.



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For Gunsmiths and Tool Makers.
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Rapid, Active, Prompt.
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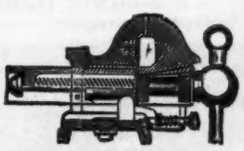

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MANUFACTURERS OF
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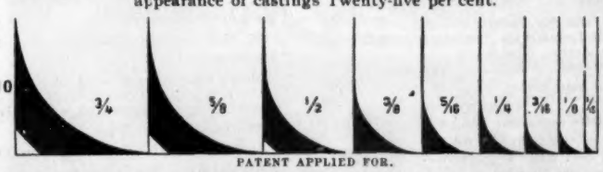

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14x6 Ames Lathe, rise and fall carriage with chuck.
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Two 4-spindle gang drills.
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A number of new factories have been induced to locate—largely through the instrumentality of this company—at towns on its lines. The central position of the States traversed by the Chicago, Milwaukee & St. Paul Railway, makes it possible to command all the markets of the United States. The trend of manufacturing is Westward. Nothing should be permitted to delay enterprising manufacturers from investigating. Confidential inquiries are treated as such. The information furnished a particular industry is reliable.

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W. H. Robertson, Chicago, Ill.

Presses—
Toledo Machine & Tool Co., Toledo, O.
Cady Mfg. Co., Cleveland, O.
Bertsch & Co., Cambridge City, Ind.

Pulleys—
J. H. & D. Lake Co., Massillon, O.

Pulverizing Machinery—
American Mining & Milling Machinery Co., Cleveland, O.

Pumps (Steam)—
E. H. Jones & Co., Cleveland.
Brightman Stoker Co., Cleveland, O.

Radial Drills—
Bickford Drill & Tool Co., Cincinnati, O.
Railroad Castings—
Vulcan Iron Works Co., Toledo, O.
Railway Supplies—
Cleveland City Forge & Iron Co., Cleveland.
Garden City Sand Co., Chicago, Ill.
Rock Breakers—
American Mining & Machinery Co., Cleveland.
Rolling Mill Machinery—
The Lloyd-Booth Co., Youngstown, O.
Roofing (felt)—
Berger Bros., Philadelphia, Pa.
Consolidated Roofing Works, Columbus, O.
Excelsior Paint & Roofing Co., New York.
Sand and Chill Rolls—
The Lloyd-Booth Co., Youngstown, O.
Saws—
Peter Gerlach & Co., Cleveland.
Schools—
Correspondence School of Mechanics, Scranton, Pa.
Scrap Iron & Steel—
Klein & Cohn, Cincinnati, O.
Screens for Coal Ore, Etc.
Robt. Aitchison Perforated Metal Co., Chicago.
Harrington & King Perforating Co., Chicago.
Hendrick Mfg. Co., Ltd., Carbondale, Pa.
Screws—
Illinois Screw Co., Chicago, Ill.
Second-Hand Machinery—
Prentiss Tool & Supply Co., Chicago, Ill.
Hill, Clarke & Co., Chicago, Ill.
W. H. Robertson, Chicago, Ill.
Dawson & Goodwin, Chicago, Ill.
Shearing and Punching Machinery—
Bertsch & Co., Cambridge City, Ind.
Toledo Machine & Tool Co., Toledo, O.
Cady Mfg. Co., Cleveland, O.
Dawson & Goodwin, Chicago, Ill.
Sheet Iron—
Cleveland Rolling Mill Co., Cleveland.
Berger Bros., Philadelphia, Pa.
Smoke Consumer—
Brightman Stoker Co., Cleveland, O.
Smokeless Furnaces—
Brightman Stoker Co., Cleveland, O.
Special Machinery—
Toledo Machine & Tool Co., Toledo, O.
Cady Mfg. Co., Cleveland, O.
Bertsch & Co., Cambridge City, Ind.
Stamping and Punching—
Cady Mfg. Co., Cleveland, O.
Stand Pipes—
The J. C. McNeil Co., Akron, O.
Steam Boiler Inspectors—
Hartford Steam Boiler Inspection & Insuranc Co., Hartford, Conn.
Steam Shovels and Dredges—
Bucyrus Steam Shovel & Dredge Co., Bucyrus, O.
Vulcan Iron Works Co., Toledo, O.
Steel—
Wm. Jessop & Sons, Ltd. New York, N. Y.
Steel Castings—
Chester Steel Casting Co., Philadelphia, Pa.
Wm. Jessop & Sons, Ltd., New York, N. Y.
King & Andrew Co., Chicago, Ill.
Steel Rails, Blooms and Billets—
Cleveland Rolling Mill Co., Cleveland.
Steel Stamps and Stencils—
J. H. Fleharty & Co., Cleveland.
James Murdock, Jr., Cincinnati, O.
Stokers—
Brightman Stoker Co., Cleveland, O.
Turnbuckles—
Cleveland City Forge & Iron Co., Cleveland.
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S. Freeman & Sons Mfg. Co., Racine, Wis.
R. Laird & Son, Galion, O.
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Berger Bros, Philadelphia, Pa.
Tinning Machinery—
The Lloyd-Booth Co., Youngstown, O.
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Wm. Jessop & Sons, Ltd., New York, N. Y.
Tramways—
Trenton Iron Co., Trenton, N. J.
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A. P. Quint, Hartford, Conn.
Twist Drills—
Cleveland Twist Drill Co., Cleveland.
Valves—
Berger Bros., Philadelphia, Pa.
Vises—
Capital Machine Tool Co., Auburn, N. Y.
Ventilating Fans—
E. H. Jones & Co., Cleveland.
Brightman Stoker Co., Cleveland, O.
Washers—
Milton Mfg. Co., Milton, Pa.
Water, Gas and Steam Pipe—
Addyston Pipe & Steel Co., Cincinnati, O.
Radford Pipe & Foundry Co., Cincinnati O.
Well Drilling Machinery—
Williams Bros., Ithaca, N. Y.
Wire Fence Ratchets—
J. Stauffer, Dayton, O.
Wire Rope—
Trenton Iron Co., Trenton, N. J.
Wire Machinery—
John Adt & Son, New Haven, Conn.
Cady Mfg. Co., Cleveland, O.

Valley Ry.

Depot foot of So. Water St.
City Office 143 Superior St.

	Arrive.	Depart.
Akron & Canton	*6:40 P M	*7:10 A M
Akron, Canton & Valley Jctn.	*10:10 A M	*3:15 P M
Valley Jctn. & Way Stations	†6:40 P M	†7:10 A M
Akron, Canton & Chicago	*8:00 A M	*6:30 P M
Wooster and Garrett	†3:00 P M	†11:00 A M
Wooster		*6:30 P M
Akron, Canton & Marietta	†3:00 P M	†11:00 A M
Steubenville, Wheeling, Washington, D. C., and Baltimore	†3:00 P M	†11:00 A M

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Baltimore and Washington	* 1.40 pm	*11.15 am
Alliance and Pittsburgh	* 1.40 pm	*11.15 am
Ravenna and Alliance	† 3.25 pm	† 9.50 am
Hudson and Ravenna	* 5.10 pm	* 8.15 am
Philadelphia and New York	*11.10 pm	* 5.25 am
Baltimore and Washington	*11.10 pm	* 5.25 am
Alliance and Pittsburgh	*11.10 pm	* 5.25 am

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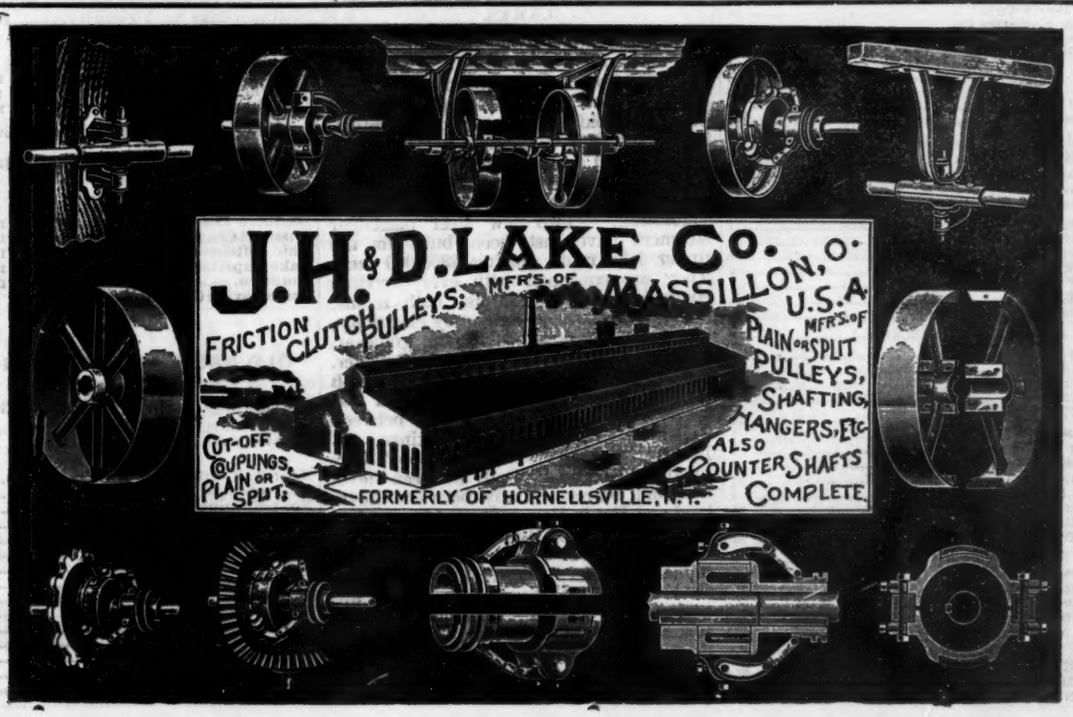
Xenia and Cincinnati	* 8.40 am	* 5.15 pm
Akron, Columbus & Zanesville	†2.45 am	*11.55 pm
Akron and Columbus	* 8.40 pm	*5.15 pm
Akron and Orrville	† 3.25 pm	† 9.50 am
Columbus and Cincinnati	* 8.00 pm	* 7.00 am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Visit picturesque Mackinac Island. It will only cost you about $12.50 from Detroit; $15 from Toledo; $18 from Cleveland, for the round trip, including meals and berths. Avoid the heat and dust by traveling on the D. & C. floating palaces. The attractions of a trip to the Mackinac region are unsurpassed. The island itself is a grand romantic spot, its climate most invigorating. Two new steel passenger steamers have just been built for the upper lake route, costing $300,000 each. They are equipped with every modern convenience, annunciators, bath-rooms, etc., illuminated throughout by electricity, and are guaranteed to be the grandest, largest and safest steamers on fresh water. These steamers favorably compare with the great ocean liners in construction and speed. Four trips per week between Toledo, Detroit, Alpena, Mackinac, St. Ignace, Petoskey, Chicago, "Soo," Marquette and Duluth. Daily between Cleveland and Detroit. Daily between Cleveland and Put-in-Bay. The cabins, parlors and staterooms of these steamers are designed for the complete entertainment of humanity under home conditions; the palatial equipment, the luxury of the appointments, makes traveling on these steamers thoroughly enjoyable. Send for illustrated descriptive pamphlet. Address A. A. SCHANTZ, G. P. & T. A., D. & C. Detroit, Mich.

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IRON ORE.

[On Lake Erie docks.]

No. 1 Specular, Bessemer	3.00@ 3.35
No. 1 Bessemer hematite	2.75@ 0.00
Hematites No. 1 non-Bessemer	2.25@ 2.50
No 1. Specular, non-Bessemer	2.50@ 3.00

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$13 00@$00 00
No. 1 Strong Foundry	11 25@ 11 50
No. 2 Strong Foundry	10 25@ 10 50
No. 1 Gray Forge, red short	9 50@ 9 75
No. 2 Gray Forge, neutral	9 25@ 00 00
No. 1 American Scotch	11 60@ 00 00
No. 2 American Scotch	10 60@ 00 00
Lake Superior Charcoal	14 00@ 14 50
PITTSBURG:	
No. 1 Foundry	$11 25@$11 50
No. 2 Foundry	10 50@ 11 00
Gray Forge	9 25@ 9 50
White and Mottled	9 00@ 9 25
Warm Blast Charcoal	18 00@ 19 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	13 00@ 00 00
CHICAGO (reported by our representative:)	
Lake Superior Charcoal	$14 50@$15 00
Local Coke Foundry No. 1	11 50@ 12 00
Local Coke Foundry No. 2	10 50@ 11 00
Local Coke Foundry No. 3	10 00@ 10 50
Local Scotch Foundry No. 1	11 50@ 11 75
Local Scotch Foundry No. 2	10 75@ 11 25
Local Scotch Foundry No. 3	10 25@ 10 75
Southern Coke No. 1	10 75@ 11 00
Southern Coke No. 2	10 50@ 10 75
Southern Coke No. 3	10 25@ 10 50
Southern No. 1 Soft	10 50@ 10 75
Southern No. 2 Soft	10 25@ 10 50
Southern Silveries No. 1	11 50
Southern Silveries No. 2	11 00
Jackson Co Silveries	15 50@ 16 00
Ohio Silveries No. 1	14 00@ 14 50
Ohio Silveries No. 2	13 00@ 13 50
Ohio Strong Softeners	13 00@ 14 00
Alabama Car Wheel	17 50@ 18 00
Southern Charcoal No. 1	14 50@ 15 00
Southern Charcoal No. 2	14 00@ 14 50
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$10 25@$10 50
Southern Coke No. 2 and No. 1 Soft	9 25@ 9 50
Hanging Rock Coke, No 1	12 00@ 12 50
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 00
Tennessee Charcoal No 1	14 00@ 14 50
Jackson County Stone Coal No 1	14 50@ 16 00
Southern Coke, Grey Forge	8 75@ 9 00
" " Mottled	8 50@ 8 75
Standard Alabama Car Wheel	16 25@ 17 25
Tennessee " "	15 50@ 16 00
Lake Superior " "	16 00@ 16 50
BUFFALO (reported by Rogers, Brown & Co.)	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$11 50
No. 2 Foundry Strong Coke Iron Lake Superior Ore	11 00
Ohio Softener No. 1	11 50
Jackson Co. Silvery No. 2	15 50@ 16 50
Lake Superior Charcoal	14 75
Tennessee Charcoal	15 50
Southern Soft No. 1	11 00
Southern Soft No. 2	10 50
Alabama Car Wheel	16 00@ 17 50
Hanging Rock Charcoal	18 50
LOUISVILLE (reported by Geo. H. Hull & Co.)	
Southern Coke No. 1 Foundry	$10 25@$10 50
Southern Coke No. 2 Foundry	8 75@ 9 25
Southern Coke No. 3 Foundry	8 50@ 8 75
Gray Forge	8 00@ 8 50
Southern Charcoal No. 1 Foundry	12 50@ 13 50
Car Wheel	15 00@ 15 50
Spathite	11 25@ 11 75
ST. LOUIS (reported by Rogers, Brown & Meacham):	
Southern Coke No 1	$10 75@$11 00
Southern Coke No. 2	9 75@ 10 00
Southern Coke No. 3	9 50@ 9 75
Southern Gray Forge	9 00@ 9 25
Southern Charcoal No. 1	14 00@ 14 50
Missouri Charcoal No. 1	14 50@ 15 00
Ohio Softeners	14 50@ 15 00
Lake Superior	16 50@ 17 00
Southern	16 75@ 17 25
Connellsville Coke, St. Louis	4 50

OLD RAILS AND SCRAP METAL.

[Prices paid by mills.]

	GROSS TONS
Old iron rails	$12 00
Old steel rails	10 00
	NET TONS
No. 1 R. R. wrought scrap	$ 9 00
No. 1 wrought scrap	8 50
No. 1 Machine cast scrap	8 50
Iron axles	15 00
Axle turnings	8 00
Wrought turnings (free from cast)	6 50
Cast borings	4 75
Uncut wrought iron boilers	3 00
Steel boiler plates	8 00
Grate bars	4 00
Pipes and flues (clean)	7 00
Tank iron	6 00
Hoop and band iron	5 00
Sheet iron	5 00
Wrought drillings	6 00
Malleable iron	7 00

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The most Marvelous Lubricant Known.
Used Dry, or Mixed with Water, Oil or Grease
NOT AFFECTED BY HEAT, COLD, STEAM OR ACIDS.
An Interesting and Instructive Pamphlet will be sent Free of Charge.
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ORDER DIRECT FROM THE
Iron Clad Paint Co.
And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.
IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.
FURNISHED both Dry and Ground in Oil
USED BY NEARLY ALL THE RAILROADS.

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. mill)	1.30c@1.40c
Angles	1.15c@1.20c
Tees	1.40c@1.50c
Universal Plates	1.25c
Sheared Plates	1.35c

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 30
4½ to 6 by ⅜ to 1 inch	1 35
1½ to 6 by 1⅛ to 2 inch	1 50
1¼ & 1⅜ by ⅜ to ¾ inch	1 35
1 & 1⅛ by ⅜ to ¾ inch	1 40
⅝, ¾, ⅞, by ⅜ to ⅝ inch	1 50

Round and Square.

1 to 1⅞ inch	1 30
2 to 2¾ inch	1 40
2¾ to 3¼ inch	1 55
3⅜ to 4 inch	1 80
4¼ to 4½ inch	2 40
4¾ to 5 inch	2 60

Oval.

⅜ to 1¼ inch	1 50
⅜ to ¾ inch	1 50
½	1 70
¾	1 90

Half Oval and Half Round.

1¼ to 3 inch	1 8,
⅜ to 1½ inch	1 65
⅜ to ¾ inch	1 90
½	2 05
⅝	3 15

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 4?
1 to 1⅜ by ¼ and 5-16 inch	1 45
¾ to ⅞ by ¼ and 5-16 inch	1 55
½ to ⅝ by ¼ and 5-16 inch	1 80

Hoop Iron.

1 7-16 to 4, No. 13, 14 15 and 16	1 85
1 7-16 to 2, No. 17, 18 and 19	1 90
1 7-16 to 2, No. 20	2 00
1 7-16 to 2, No. 21	2 10
1 7-16 to 2, No. 22	2 20
1⅛ to 1¾, No. 13, 14 and 15	1 90
1⅛ to 1¾, No. 16, 17 and 18	1 95
1⅛ to 1¾, No 19 and 20	2 00
1⅛ to 1¾, No. 21	2 10
1⅛ to 1¾, No. 22	2 20
15-16 and 1 inch, No. 13, 14 and 15	1 85
15-16 and 1 inch, No. 16, 17 and 18	2 00
15-16 and 1 inch, No. 19 and 20	2 10
15-16 and 1 inch, No. 21	2 20
15-16 and 1 inch, No. 22	2 30
⅞, No. 13, 14 and 15	2 10
⅞, No. 16. 17 and 18	2 20
⅞, No. 19 and 20	2 30
⅞, No. 21	2 40
⅞, No. 22	2 50
13-16, No. 13, 14 and 15	2 20
13-16, No. 16, 17 and 18	2 30
13-16, No. 19 and 20	2 40
13-16, No. 21	2 50
13-16, No. 22	2 60
¾, No. 13, 14 and 15	2 30
¾, No. 16, 17 and 18	2 45
¾, No. 19 and 20	2 55
¾, No. 21	2 65
¾, No. 22	2 75
11-16, No. 13, 14 and 15	2 55
11-16, No. 16, 17 and 18	2 60
11-16, No. 19 and 20	2 70
11-16, No. 21	2 80
11-16, No. 22	2 90
11-16, No. 23	3 00
⅞, No. 13, 14 and 15	2 60
⅞, No. 16, 17 and 18	2 70
⅞, No. 19 and 20	2 80
⅞, No. 21	2 90
⅞, No. 22	3 00
⅞, No. 23	3 10
9-16, No. 13, 14 and 15	2 80
9-16, No. 16, 17 and 18	2 90
9-16, No. and 20	3 00
9-16, No. 21	3 10
9-16, No. 22	3 20
9-16. No. 23	3 30
7-16 and ½ inch, No. 13, 14 and 15	3 00
7-16 and ½ inch, No. 16, 17 and 18	3 10
7-16 and ½ inch, No. 19 and 20	3 20
7-16 and ½ inch, No. 21	3 30
7-16 and ½ inch, No. 22	3 40
7-16 and ½ inch, No. 23	3 50
⅜, No. 13, 14 and 15	3 50
⅜, No. 16, 17 and 18	3 60
⅜, No. 19 and 20	3 70
⅜, No. 21	4 00
⅜, No. 22	4 10
⅜, No. 23	4 25

Light Band.

1¼ to 6 by ⅛ to 3-16 inch	1 60
1½ to 6 by Nos. 11 and 12	1 65
1 to 1¾ by ⅛ to 3-16 inch	1 65
1 to 1¾ by Nos. 11 and 12	1 70
⅝ and 13-16 by ⅛ to 3-16 inch	1 80
⅝ and 13-16 by Nos. 11 and 12	1 85
¾ and 11-16 by ⅛ to 3-16 inch	1 90
¾ and 11-16 by Nos. 11 and 12	1 95
⅝ and 9-16 by ⅛ to 3-16 inch	2 05
⅝ and 9-16 by Nos. 11 and 12	2 10
½ by ⅛ to 3-16 inch	2 20
½ by Nos. 11 and 12	2 25

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	1 80
⅞ inch, " " " " 13 and 14	1 90
¾ inch, " " " " 11 and 12	1 95
¾ inch, " " " " 13 and 14	2 15

Sheet Iron.

No. 10	1 85
No. 12	1 90
No. 14	1 95

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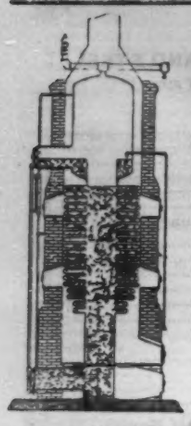

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No. 25 26	2 50
No. 27	2 60

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Marine Flange	2 35
Fire Box	3 35

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96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

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ROUND, SQUARE AND OCTAGON.	cts. ₱ lbs.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08½
7-16 to ⅜ and 2⅜ to 3 in.	09
3⅛ to 4 in.	09½
⅜ to 11-16 and 4⅜	10
⅛ to 6 in.	10½
¾ to 9-32 and 6⅛ to 7 in.	11
3-16 in	13

Flats.

	cts. ₱ lbs.
2 to 9-16 in. wide by 2 to ⅝ thick	8

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Tire	"	1 85
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Toe Calk	"	2 05
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English Tool Steel.

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" "Choice"	35c

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½, ⅝, 11-16 and ¾ inches diameter	3 70
Bridge ½, ⅝, 11-16 and ¾ inch diam	3 40

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American	₱ lb 9@10
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Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&5
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis 45

Blowers and Exhausters.

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Boston Blower Co.,	dis 35
Buffalo	dis 40

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Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 35
Horton's Universal	dis 40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

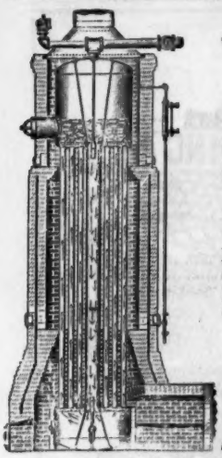
Cast Steel	₱ 3½
Iron, steel points	₱ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1½"	dis 50&10
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 46 gr.	150 gr.	Flour, C. F F. FF.
Kegs, ₱ lb	4½c	5 c	2½c
½ kegs ₱ lb	4¾c	5¼c	2¾c
¼ kegs ₱ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10 lb cans less than 10	10 c	10 c	7½c



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Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F.	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70
Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	15c
" " " " over 5 lbs	12c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3¼	3⅛
Hexagon	15½	11½	8½	6	5¾	5¼	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887	dis 85
Standard Penny Nails, ₩ keg card rate	
{ Car lots	$1.20
{ Less than car lots	$1.35

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's). No. 1, $3.60: No. 2, $4.00: No 3, $4.40 ₩ doz	dis 10@10&10

Packing, Steam.

Boston Belting Co.	dis 60
American Packing Hemp	₩ lb 9@10
Russia " "	₩ lb 14
Italian " "	₩ lb 13@19
Plumbago Piston	₩ lb 40
Peerless	₩ lb 60
Morrison's "	₩ lb 45
Square Flax "	₩ lb 50
Sheet Rubber	₩ lb 12&24
Excelsior Rubber	₩ lb 48
Rainbow { Full Rolls	45c ₩ lb
Rainbow { Less than Full Rolls	50c ₩ lb
Eclipse Gasket	₩ lb 75

Picks.

Railroads, 5 to 6 lbs	$12 dis 60
" 6 to 7 lbs	$13 dis 60

Pulleys.

Iron Pulleys, Walker List	dis 50
Medart Pulleys	dis 50
Split Wood Pulleys	dis 55@60

Rivets.

Iron, Thousand, list November 17	dis 50&10@60
Iron, Ordinary, Cooper's Block and Carriage list November 17	dis 50&10@60
Copper	dis 50@50&10

Saws.

Disston's Circular	dis 40&10
" Band	dis 25
" Scroll	Net
Hack Saw Stubs	dis 20
" " Eureka	dis 20
" " Star	dis 20
Saw Swages Diston's	dis 30
Atkins' Circular Saws	dis 40&45
" Mill, Mulay and Drag Saws	dis 40&10
" Wood Saws	dis 40&10
" Silver Steel Diamond Cross-cut Saws	70c per ft
" Dexter Cross-cuts	50c "
" Diamond "	30c "
" Tuttle Tooth Cross-cuts	25c "
" One-man Cross-cuts	32c "
No. 1 Handles	23c per pair
No. 6 "	16c "
Excelsior Saw Tools	$6 per doz
Derfection "	$15 "
Petroit Saw Works, Circular	dis 50
" " " Band	dis 25
" " " Mulay	dis 45

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

New List, Jan. 18, 1884

Brass	dis 30
Copper	dis 40
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	.95c ₩ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 35&10& 5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis 40

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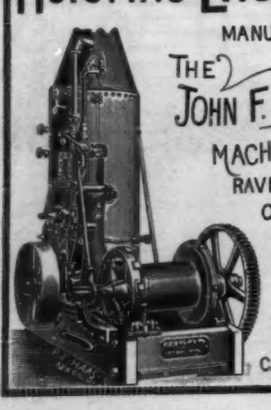

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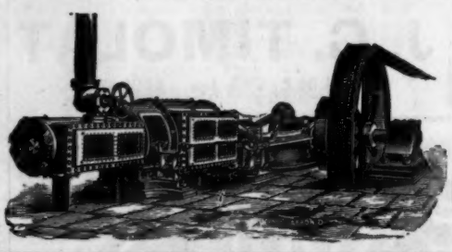

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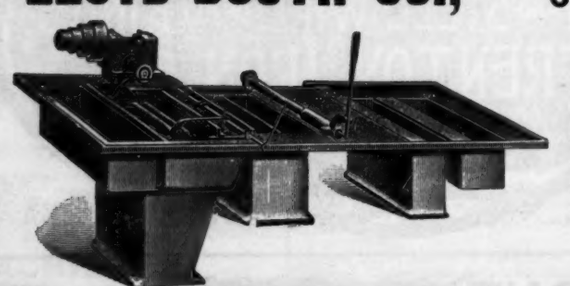

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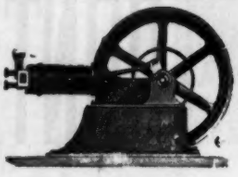

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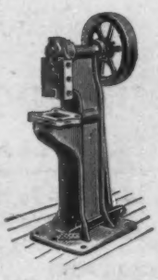

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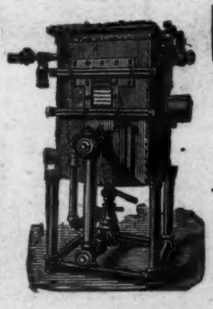

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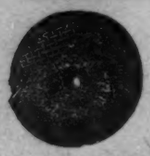

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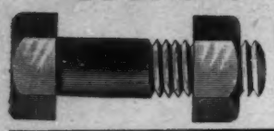

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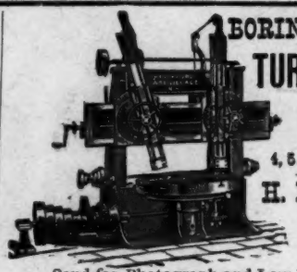

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